SARDAR DYAL SINGH
PUBLIC
LIBRARY
NEW DELHI

★

Class No. [illegible]
Book No [illegible]
Accession No. [illegible]

DYAL SINGH PUBLIC LIBRARY
ROUSE AVENUE NEW DELHI-1

Cl No 15C.13 B957A

Ac No 1108 Date of release for loan

This book should be returned on or before the date last stamped below An overdue charge of 0 6 P will be charged for each day the book is kept overtime

---

9 OCT 2000 6 NOV 2004

5419

110 2003

APPLIED PSYCHOLOGY

APPLIED PSYCHOLOGY

HAROLD ERNEST BURTT, Ph.D.

Professor of Psychology
Ohio State University

◆

NEW YORK
PRENTICE-HALL, INC.

COPYRIGHT 1948 BY
PRENTICE-HALL, INC.

ALL RIGHTS RESERVED. NO PART OF THIS BOOK MAY BE REPRODUCED IN ANY FORM, BY MIMEOGRAPH OR ANY OTHER MEANS, WITHOUT PERMISSION IN WRITING FROM THE PUBLISHERS.

First Printing ....April, 1948
Second Printing ....January, 1949
Third Printing ....July, 1949
Fourth Printing ....April, 1950

PRINTED IN THE UNITED STATES OF AMERICA

To

Ruth Anne

PREFACE

This book is intended for two types of readers: the college student who has had an introductory course in psychology and desires orientation toward the science in its practical aspects, and the layman who is concerned with the general scope of applied psychology and possibly with a particular interest in some limited phase of it. With these readers in mind, a certain degree of compromise is necessary between a very technical text and a popular treatise. The effort has been made to give a scientific treatment of the subject that is reasonably thorough but not heavy and over the head of the general reader. For those who have not taken an introductory course in psychology, the second chapter gives a concise overview of the basic principles which might be obtained in such a course.

A balanced emphasis on the different aspects of applied psychology has been attempted, but this may not be evident from a glance at the varying numbers of pages in certain chapters. The difficulty is that many topics, for example, psychological tests, are involved at numerous places in the discussion. The general policy has been to go into detail on a particular topic when it first comes up in the course of the discussion, giving adequate treatment to it there and merely making cross reference later. Thus, later chapters, without such cross references, would perforce be longer.

The discussion is moderately documented and supplemented by tabular or graphic material. It is not the intention to support every detailed statement by citing chapter and verse to the extent of slowing down the discussion, but the references included should enable the interested reader to run down most of the original sources from which material was drawn.

Statistics is always a problem in a work of this sort. Applied psychology in its actual practice draws heavily on statistics. Ideally, a student or lay reader ought to know something about basic statistics before pursuing applied psychology at all. Naturally, this is not feasible but neither does it seem advisable to devote the initial portion of the book to a deadly overview of statistics. However, a few of the more necessary statistical notions are introduced in the text when they first become pertinent. Enough detail is given, it is hoped, for the reader to pursue the work intelligently whenever those same principles come up again. In some cases where a bit more extensive treatment is desirable, there is supplementary statistical material in the appendix.

Grateful acknowledgement is made to the following publishers for permission to quote tabular or graphic material: D. Appleton-Century Company for tables from *Judging Human Character* by H. L. Hollingworth and *Principles of Applied Psychology* by A. T. Poffenberger; Clark University Press for tables from *Criminal Intelligence* by Carl Murchison, and a figure from *Handbook of Social Psychology* by Carl Murchison; Harper & Brothers for charts from *Psychology and the New Education* by S. L. Pressey and F. P. Robinson, and a figure from *Employment Psychology* by H. E. Burtt; The Public School Publishing Company for a table from *Research Adventures in University Teaching* by S. L. Pressey *et al.;* likewise to the editors of the following technical journals for permission to quote tabular or graphic material: *Occupations,* table from Volume 26, 1947; *Personnel Journal,* Volume 1, 1922, Volume 9, 1930, Volume 14, 1936; *American Journal of Psychology,* Volume 51, 1938; *Educational Research Bulletin,* Volume 20, 1941; *Journal of Applied Psychology,* Volume 7, 1923, Volume 8, 1924, Volume 13, 1929, Volume 17, 1933, Volume 18, 1934, Volume 20, 1936, Volume 21, 1937, Volume 26, 1942, Volume 27, 1943, Volume 25, 1941; *Journal of Criminal Law and Criminology,* Volume 15, 1924; *Journal of Genetic Psychology,* Volume 55, 1939; and to The Controller of His Britannic Majesty's Stationery Office for graphs and tables from *Reports of the Industrial Health Research Board,* No. 6, 1920, No. 29, 1924, No. 39, 1927, No. 47, 1928, No. 56, 1929, No. 69, 1934, No. 82, 1938.

I am especially indebted to Walter V. Bingham for painstaking reading of the manuscript and a wealth of helpful suggestions. It is especially fitting that my first psychology teacher who was largely instrumental in my pursuit of psychology as a career should continue in this advisory role. I am glad to take this opportunity to acknowledge his counsel on problems of mutual interest extending through a good part of a professional lifetime.

Columbus, Ohio
January, 1948

HAROLD E. BURTT

CONTENTS

CHAPTER PAGE
1. INTRODUCTION 1
2. SOME PSYCHOLOGICAL FUNDAMENTALS 10
3. PSEUDO-PSYCHOLOGY 38
4. EDUCATIONAL SIGNIFICANCE OF DIFFERENCES IN INTELLIGENCE . . 64
5. OTHER INDIVIDUAL DIFFERENCES OF SIGNIFICANCE FOR EDUCATION . 86
6. LEARNING FROM THE STANDPOINT OF THE EDUCATIONAL SYSTEM . . 115
7. PERSONAL EFFICIENCY 151
8. VOCATIONAL GUIDANCE 187
9. PSYCHOLOGY IN GENERAL MEDICAL PRACTICE 222
10. NATURE AND DIAGNOSIS OF MENTAL DISORDERS 238
11. PSYCHOTHERAPY 269
12. PSYCHOLOGY OF TESTIMONY 291
13. PSYCHOLOGICAL TECHNIQUES FOR CRIME DETECTION 322
14. PSYCHOLOGICAL FACTORS IN CRIME 361
15. PSYCHOLOGICAL FACTORS IN CRIME PREVENTION 389
16. PSYCHOLOGICAL TESTS IN EMPLOYMENT 413
17. OTHER CONTRIBUTIONS OF PSYCHOLOGY TO EMPLOYMENT METHODS . 455
18. EFFICIENCY IN INDUSTRIAL WORK 489
19. ENVIRONMENTAL FACTORS IN INDUSTRIAL EFFICIENCY 527
20. FATIGUE, MONOTONY, AND ACCIDENTS 562
21. MORALE 611
22. METHODOLOGY AND SELECTING OF ADVERTISING APPEALS 648
23. CONTROLLING THE PROSPECT'S ATTENTION 688
24. INFLUENCING THE PROSPECT'S MEMORY 732
25. ADVERTISING MEDIA 749
26. OUTLYING FIELDS 767
APPENDIX I 803
APPENDIX II 808
INDEX 813

ILLUSTRATIONS

FIGURE PAGE

1. Frequency Curve 34
2. Growth of Intelligence 77
3. Social Structure of a Sixth-Grade Class 109
4. Learning Curves for English Composition 136
5. Practice Curves 137
6. Curves of Forgetting 141
7. Retention with Review 141
8. Test Profiles of Two Persons 215
9. Change of Opinion in the Course of a Trial 314
10. Typical Manual Response Patterns 331
11. Typical Breathing and Blood Pressure Records 335
12. Setting Critical Score in Trade Test Items 450
13. Scholarship and Salary 468
14. Effect of Different Wage Payment Systems 493
15. Method of Carrying Loads by Hand 514
16. Effectiveness of Team as Related to Strength of Members . . 522
17. Illumination and Visual Efficiency 528
18. Noise and Efficiency of Work 550
19. Typical Production and Accident Curves 568
20. Location of Rest Pauses 580
21. Production Curves and Monotony 587
22. Effect of White Space 701

I

INTRODUCTION

Some psychologists work in soundproof laboratories and others in the hurly-burly of everyday life. Both types are necessary. Science always will have a place for the man who dedicates himself to the discovery of truth for its own sake and seeks basic facts and principles regardless of their utility. But many of the findings of the laboratory worker eventually develop a practical implication that was unsuspected, and at that point the applied scientist takes over. For instance, the discovery that electrons were emitted from a hot wire was originally of only theoretical interest but now it is a principle that operates in every radio receiver. And so it has been with psychology. We first studied human experience and behavior out of natural scientific curiosity, but gradually we began to realize that many of the basic principles thus discovered could be applied to problems of education, medicine, law, and business.

The full development of this aspect of psychology was delayed for two reasons. One was the necessity of living down the reputation created by the pseudo-psychologists. Many a worthless proposition for increasing personal efficiency, analyzing character, or curing ailments was presented under the guise of psychology. People invested in such propositions and inevitably were disillusioned. Subsequently, if they encountered a genuine psychologist they were not interested in his possible contribution to the solution of their problems because they had tried this "psychology" already. These "gold bricks" will be discussed in a later chapter. The academic psychologists were not entirely guiltless either. Some of them who lacked practical experience and had merely read about the applied aspects of psychology overstated the case in their classrooms.

The other, and more fundamental, reason was a different emphasis in psychology itself—a shift from general laws to individual differences—that was necessary before it could realize its maximum utility. Like the other sciences psychology very properly investigated first its general principles such as the laws governing the learning process or the intensity of sensations. But in the practical field the important consideration often is individual differences. One school child with low intelligence is in the fifth grade, whereas another of the same chronological age, but with a higher mental age, is in the tenth. One criminal has delusions of persecution, and another delinquent merely came from a home with undue emotional tension. One prospective taxi driver has slow reaction time and a high degree of emotional instability and is destined to have accidents, whereas another makes favorable scores on the aptitude tests and is a good employment risk.

It was not until the basic groundwork was laid that the psychologists turned their attention to these individual differences. This interest began to crystallize about the turn of the century: Cattell gave some simple mental tests to his students at Columbia in the nineties; and Binet was developing his intelligence tests for school children at about that time. By 1910, Munsterberg was applying psychological techniques in a wide variety of fields, including legal testimony, crime detection, psychotherapy, and vocational aptitude tests. Meanwhile, Gale and Scott did pioneer work in the psychology of advertising. A bureau was organized at the Carnegie Institute of Technology to develop tests for selecting salesmen and to study the whole problem of selling from a psychological angle. Then came the first World War.

Psychology in the First War

When the emergency arose, the psychologists, like the other scientists, attempted to play their part. Their contribution, when viewed in the perspective of present-day applied psychology, was meager, but they learned a lot from this experience. Their greatest activity was in the field of personnel. For example, there was the Army Alpha, the first extensive group test of intelligence. Aptitude tests were developed for aviators, gun pointers, and night observers. Trade tests were constructed, and rating scales were devised and used to evaluate officers. The psychologists made some progress with problems of morale and with methods for locating psychoneurotic individuals.

Psychology Between the Wars

Some of these methods and tests carried over into the years following the first War. The Alpha intelligence test served as the prototype of subsequent group intelligence tests. The statistical methods developed in connection with selecting aviators became standard practice in the validation of vocational aptitude tests. "Neurotic Inventories," such as

Woodworth's, designed for discovering poor mental risks among soldiers, were improved and incorporated in routine clinical procedures. Many psychologists whose first connection with the applied aspect of the science came about during these war years continued in their interest. Some engaged in applied psychology projects as consultants to industrial organizations, some worked in private practice, and others, somewhat incidentally, used applied psychology in connection with academic work. It will be worth while to examine some of these efforts in a bit more detail.

Some of the psychometric work developed in the military services carried over into educational institutions in the postwar period. The application of intelligence tests to academic problems, such as predicting the progress of students and advising them how far to go in their educational program, was a case in point. Along with this came the development of educational tests to measure proficiency in school subjects in a more standardized fashion than by the examinations prepared by the individual teacher. This development and other aspects of psychology in the school situation began to open up careers for school psychologists. Other aspects of academic personnel work also came within the purview of the psychologist. Students with handicaps in study habits or in skills such as reading underwent diagnostic procedures and received remedial treatment. Another application of psychology in the educational system dealt with vocational guidance, where the techniques for evaluating aptitudes and interests, developed initially for military purposes, carried over to the guidance problems of the student.

Meanwhile, in addition to objective tests other diagnostic techniques were developing. Psychologists in clinics were perfecting methods of interview, diagnosis, and therapy. They began to work in mental hospitals, as Franz and Wells had done even before the war, and to promote mental hygiene in general. They drew closer to those medical people who were engaged in common problems. Many psychologists took positions in institutions for various kinds of deviates—mentally defective, mentally diseased, and delinquent. There they did diagnostic and therapeutic work.

Industries began to adopt some of the personnel methods developed in the army. A few of them put full-time psychologists on their staffs. They developed procedures for selecting employees and they improved methods of training and supervision, looking toward better industrial relations and more favorable employee attitudes. Research on the psychology of advertising came into the picture, including research on radio and listening habits. Attitude scales and interviewing techniques were perfected to help in evaluating personal attitudes and opinions. These were used by industry, by some government agencies, and eventually by polling organizations.

One government agency deserves special mention because of its extensive development and use of psychological techniques. This was the United States Employment Service, originally in the Department of Labor and later under the War Manpower Commission. It initiated an occupational research program in the early thirties, which included an extensive program of job analysis that culminated in the compiling of the *Dictionary of Occupational Titles.* This originally listed definitions of some 18,000 jobs, and many more have been added subsequently in supplements. This organization likewise developed numerous trade tests for use in placement services. It also developed sets of job families, in which jobs are grouped according to their relatedness in processes, materials, and needed characteristics of the worker. These job families implemented the efforts of employment people to capitalize on the previous vocational experience of an individual when placing him in a new job.

One other phase of applied psychology in the inter-bellum period should be mentioned. This was the development of cooperative research. For some types of problems, data were needed from a variety of sources. A single industrial concern might not have sufficiently complete data to solve a problem; if several concerns pooled their data, a much more effective study could be made. The earliest major effort of this sort was the Bureau of Salesmanship Research, established by Bingham in 1916, with fifteen cooperating business concerns, at the Carnegie Institute of Technology. Another was the Life Insurance Sales Research Bureau, likewise organized by Bingham at Carnegie Tech and later moved to Hartford. A number of the large insurance companies contributed to a common pool in order to hire a technical staff and submitted data from their files, on the basis of which elaborate studies were made of techniques for predicting success in selling insurance. The Psychological Corporation was organized in 1921 and laid considerable emphasis on the promotion of cooperative research in addition to providing service to clients on a consulting basis.

Psychology in the Second War

Just before the outbreak of World War II, some of the psychologists saw it coming again and began to make some preliminary plans. An Emergency Committee was organized under the National Research Council as well as a Committee on the Selection and Training of Aircraft Pilots. These groups began to address themselves to the problem of their activities in the event of war. Meanwhile, in the Adjutant General's

Office there was set up a small Personnel Research Section under the Classification and Enlisted Replacement Branch. This was supplemented by an Advisory Committee, appointed by the National Research Council, on the Classification of Military Personnel. One of the first major projects resulting from this arrangement was the General Classification Test, which subsequently was given to all the men in the army. There were also a Mechanical Aptitude Test and a Clerical Aptitude Test. The research section developed nonlanguage tests for those who had difficulty with the printed tests. The Radio Operator Aptitude Test, which had been developed previously by the Signal Corps, was revised for more general use. A more advanced kind of test was developed for officer candidates. More than a thousand soldiers who had previously had some psychological training were given a special six months' course on Personnel Psychology under the Army Specialized Training Program.

While these projects were developing, the war actually came. Some of the tests just mentioned were used for screening draftees at reception centers. Special tests were developed for use with illiterates and were administered by persons trained for the purpose. At the outset, academic psychologists filled in temporarily until adequately trained military personnel were available. Eventually a large number of psychologists were in the service doing technical work along these lines. The range of aptitude and achievement tests was expanded gradually as the need for special tests became apparent.

The classification of draftees utilized many of the job families that had been developed by the United States Employment Service. New job families were devised that were directly related to military service. Incidentally, these same techniques were widely used in the war industries to meet the manpower needs more effectively.[1]

Special mention should be made of the classification problems in the Air Forces because of the highly specialized aptitudes required for air personnel. The program began with an Aviation Cadet Qualifying Examination. This was designed mostly for the selection of pilots, but also had more general scope. It was given to over a million people by June, 1944. It involved such abilities as reading, mechanical comprehension, vocabulary, mathematics, and perceptual facility and was designed initially to replace the formal educational requirements of college graduation that had previously been set up as prerequisite for pilot training. Then there were further developments of more specialized tests of intelligence, alertness, observation, speed of perception, personality, temperament, visual-motor coordination, and the like. Intensive research was conducted in order to develop these tests as rapidly as possible. At the peak some 15,000 men a week were being given some of these aviation tests, and by January, 1945 data were available on over half a million men.[2]

---

[1] Staff, Personnel Research Section, "Personnel Research in the Army. II. The Classification System—The Place of Testing," *Psychological Bulletin*, 1943, 40, 205–211.

The navy developed its own extensive testing program. It comprised some 14 tests for officers and 250 for enlisted personnel. Classification tests were used at recruiting and procurement offices, naval training centers, and classification centers. Achievement tests were used as a check on training programs and for advancement in rating.[3]

Another field to which the psychologists contributed was training—applying fundamental principles of learning to military skills. There were special problems to overcome—such as discovering how long the skills of a flexible gunner would persist at a high peak of effectiveness. There was the "recognition" training of air crews and anti-aircraft gunners in rapid perception and identification of aircraft or surface craft, which tended to decrease the frequency with which planes or vessels were attacked by their own friends.

Psychologists in the military services dealt with various mental adjustment problems. At the point of classification it was desirable to spot men who were so unstable that they might blow up under conditions of stress. Psychologists often worked along with medical personnel in applying clinical techniques. When men returned from combat, there was a considerable incidence of mental adjustment problems, some of which yielded to conventional types of mental hygiene treatment. Psychologists worked with such cases in convalescent hospitals—examining men, estimating the chances of recovery, helping decide upon the best program of treatment, and carrying it through—using psychometric procedures and clinical interviews. This program carried over into the postwar period.[4]

Psychologists played a part in some noncombatant fields related to the war effort. Personnel classification and training procedures were applied extensively in the war industries. The Department of Agriculture systematically checked on the attitudes of the rural population toward the food production problem, and psychologists helped train interviewers to do this checking and helped analyze the returns. The Office of War Information and other similar agencies studied public opinion in this country and analyzed foreign broadcasts with a view to diagnosis of the psychological characteristics of the enemy. Psychologists also helped the War Production Board, the O.P.A., the Forest Service in connection with fire prevention and made contributions to military intelligence which are, perforce, still secret.

---

[2] Staff, Psychological Branch, Office of the Air Surgeon, Headquarters, Army Air Forces, "The Aviation Psychology Program of the A.A.F.," *Psychological Bulletin,* 1943, 40, 759–769.

[3] Staff of Test and Research Section, Bureau of Naval Personnel, "Psychological Testing and Research in the Bureau of Naval Personnel," *Psychological Bulletin,* 1945, 42, 433–444.

[4] For a discussion of the operation of clinical psychology in the military program, see *Psychological Bulletin,* entire number for October, 1944.

Then, as things drew to a close, psychologists played a role in the readjustment of military personnel to civilian life. They helped set up counseling procedures in separation centers and they staffed vocational guidance units for veterans who had not received adequate counsel at the time of discharge. Some workers in the academic field engaged in the training of large numbers of clinical psychologists to serve in veterans' mental hospitals.

The foregoing activities were a fairly heavy drain on the manpower pool in the psychological profession. At the peak, out of 4,553 psychologists who were sufficiently qualified to belong to the professional organizations 1,006 actually were in military services, another 437 were in civilian service jobs as full-time government employees, and another 323 rendered some part-time war service. This means that more than a third of the professional group were involved.

In the postwar years a pattern similar to, yet more comprehensive than, the one after the first war developed. Many techniques developed by military psychologists were carried over into everyday situations. Persons who had observed psychological procedures operating successfully during the war explored the applicability of those procedures to some of their own problems, for example, problems in industry. Some such persons organized consulting firms. Many young men who had some contact with psychology in their military service decided on psychology as a career and engaged in the appropriate course of study. All in all, applied psychology has now become established in the scheme of things.

Scope of Applied Psychology

It remains now to take a quick preview of the scope of applied psychology as it will be discussed in the following chapters. In our culture there are four major objectives to which applied psychology has contributed: effectively educating the oncoming generation, maintaining mental health, administering justice wherever human purposes seriously conflict, and promoting economic progress. Psychology's contribution thus involves essentially the psychotechnics of education, medicine, law, and business.

Psychology in education. A primary consideration in educational psychology is the raw material with which the teacher has to work, that is, children and the ways in which they differ. Intelligence is one important respect in which children differ and tests of intelligence are widely used in schools. Other significant differences lie in the field of emotion, interest, attitude, character, and social adjustment. A second contribution of psychology to education applies the basic principles of learning to the school situation in order that the learning process may be rapid and efficient. A related problem is the provision of techniques for checking objectively and quantitatively the results of learning in school. In the later school years the pupil's progress depends not only on the teaching techniques employed but also on his own methods of study and planning—what might be termed personal efficiency. The consideration of such efficiency may be extended beyond the school years to include such things as breaking habits; developing emotional control; and improving attention, memory, and personality. The educational system in recent years has been assuming some responsibility for vocational guidance although more often this is handled by other agencies. The program centers around the client's aptitude, interest, and experience, if any, and the opportunities in the vocation under consideration.

Mental health. Applied psychology makes some minor contributions to ordinary medical practice, especially in the realm of suggestion, but its major contact lies in the field of mental health. Here the clinical psychologist and the psychiatrist have much in common. The initial consideration is diagnosis of mental illness. Usually this takes the form of clinical interviews, psychological tests, or psychoanalysis. The difficulties found by such diagnosis range from the serious and presumably incurable psychoses through the less serious psychoneuroses down to the minor mental maladjustments. Diagnosis indicates the possible direction of psychotherapy. Mechanisms that contribute to such therapy are suggestion, sublimation, and releasing the suppression. These procedures generally are applied in therapeutic interviews.

Psychology and the administration of justice. Psychology's contribution to problems of justice and crime has two aspects. The first is concerned with interpretation of sources of error on the part of a witness and elimination of mistakes in the conduct of a trial. This aspect also includes scientific crime detection in the sense of determining objectively whether the respondent is telling the truth. The other aspect deals with the criminal himself and is aimed at crime prevention. It touches on the role of such things as mental defect, insanity, suggestion, and drugs as causative factors and eugenics, control of narcotics, punishment, and education as possible methods for prevention of crime.

Psychology and economic progress. Psychology touches business or economic problems at three points: employment, industrial efficiency, and marketing. The first of these uses various predictors in order to determine the probability of success in a job. Such predictors include aptitude tests, trade tests, rating scales, personal data, and interviews. Maximum efficiency on the part of an employee after he has been hired may be furthered by applying psychological principles to his training and the organization of his work. Environmental factors such as illumination, ventilation, noise, and music have a bearing on efficiency. Fatigue, monotony, and accidents may be minimized. Psychology also contributes to the measurement and improvement of morale. In the field of advertising and selling, psychological problems arise in connection with appeals or inducements to purchase, such as suggestion, instinct, and reasoning. Various factors such as size, location, color, novelty, or pictures, are effective in controlling a prospect's attention and are studied scientifically so that the best use can be made of them. Another problem to be dealt with involves leaving a memory impression that will tend to result in a subsequent sale.

Outlying fields. The foregoing are the main fields in which psychology has been applied systematically. Some outlying fields of applied psychology may be touched on briefly, although it is a question just where to draw the line. One field deals with life enjoyment and includes the various arts and recreation. Another deals with communication and influencing people; this includes public speaking, writing, drama, moving pictures, radio, and newspapers. A third field concerns psychology in so far as it contributes to social progress. The main topics to be considered in this connection are public opinion, politics, religion, war, and peace.

2

SOME PSYCHOLOGICAL FUNDAMENTALS

THE PRESENT CHAPTER is intended primarily for the reader who has not taken an introductory course in general psychology. Later chapters will presuppose a familiarity with conventional psychological terminology, and with some of the basic facts about human behavior. If the reader has not encountered these elsewhere, the present chapter will be of interest. It is by no means exhaustive, but touches some of the main points that will facilitate the understanding of applied psychology. The reader who is already familiar with general psychology may skip immediately to the third chapter.

Naïve and scientific psychology. Everyone is an amateur psychologist of a sort and pursues the science somewhat naïvely. Our earliest life experiences were devoted mainly to things around us—food, tables, and chairs—but soon we became aware of ourselves. We noticed our failure to remember a name; we were aware of our fear, joy, or anger; we observed that our vision sometimes blurred; we attempted to locate the source of a pain; and we began to use the pronoun "I." We also began to notice other people acting much as we did when we were having those experiences and we inferred that they felt the same. It became important to understand how they felt and what they were going to do. Gradually we came to observe some regularities in human behavior; we learned, for example, that when a person frowned he was more likely to attack us than when he smiled, and we began to generalize and work out maxims, or laws, or principles. Many of these were wrong, of course, because we had inadequate data. We assumed that large ears indicated parsimoniousness, basing our generalization on a few dramatic instances where a person had both characteristics. But, still, in a crude way we were developing psychological principles.

Scientific psychology merely goes a little further, repeats the observation, collects data under carefully controlled conditions, and interprets them logically. It often applies statistical techniques, interprets the findings in terms of mathematical probability, and eventually arrives at general laws based on scientifically obtained data rather than on casual observation.

Classical psychology. Efforts to approach psychology in systematic and scientific fashion date from classical times, but the contributions were meager; Aristotle, for example, derived various laws of association. All through the Middle Ages such psychology as existed was speculative in nature. The only equipment employed by the psychologist was an arm chair. He examined his own mental process instead of observing someone else. For example, he looked at a sunset and tried to analyze the feelings that it gave him, or he noted a coin that reminded him of a trip to the city and then tried to figure out why it had reminded him of the trip rather than something else. This technique contributed little to scientific progress.

Experimental psychology. It was not until the nineteenth century that psychologists got out of the arm chair and into the laboratory. An incident in an astronomy observatory precipitated this change. The director of the observatory and his assistant, recording by the eye-and-ear method the time at which a star crossed the meridian in the telescope, disagreed *consistently*. Someone suspected that this might be due to individual differences in their speed of reacting to the star and to the sound, and this led to preliminary experiments in measuring speed of reaction to a simple visual or auditory stimulus. Other early investigations dealt with the intensity of sensations. For example, to make a sound appear twice as loud what has to happen to the physical source of the sound? Other investigators memorized lists of words to see how efficiency was influenced by the length of the list or the speed of reading.

A basic trend had developed in this early work—the tendency to limit the experiment to as few variables as possible, and keep all other variables under control. This point is fundamental in all scientific experimentation. In physics if we want to know whether the current in an electric circuit varies inversely as the resistance, we put a constant voltage on the line while we vary the resistance. So, in psychology, if we want to study the relation between changes in blood pressure and induced emotional conditions, we attempt to keep all the other factors constant. Or again, we may learn lists of words of comparable difficulty at the same rate, but sometimes relax for a few minutes after learning, and sometimes do arithmetic in those few minutes to see what happens to the effectiveness of the learning. The main point is that we employ lists of constant difficulty. This control of the extraneous variables makes the difference between a scientific and an unscientific approach in psychology just as it does in other fields.

Objective *versus* subjective approach. Recent years have brought a considerable change in methodological emphasis and underlying point of view. The earlier approach to psychology was largely subjective, that is, observing the mental state directly. The technique was called "introspection," and persons received careful training in this type of self-observation. It was essentially a private affair. Now we are more concerned with what a person does while experiencing these mental states. We note the actions that any other psychologist can observe. Now we are not so interested in the subjective feelings of fatigue as in the number of words that a person can type in a given amount of time. We are not as concerned with how the stop sign seems to blur as with whether the driver puts his foot on the brake. Time was when a terrific controversy raged over this introspection *versus* behavior point of view. Nowadays we have comparatively few genuine introspectors. To be sure, in an experiment we may ask the subject how he feels about it, and no one denies the existence of these mental states, but we simply are not as interested in them. This is especially true in applied psychology. Very frequently we cannot trust the person's subjective report anyway: the emotions which a criminal suspect tells us he is experiencing when he is actually narrating a false alibi are bound to be misrepresented. We much prefer to watch his blood pressure on a graphic record.

Quantitative *versus* qualitative. One other trend in the development of psychology may be noted—increasing emphasis on the quantitative aspect. Wherever it is feasible, we try to measure something. We repeat the observation, compute averages, measure variability, and derive correlation coefficients. In some fields, to be sure—such as clinical psychology—we rely considerably on qualitative data in individual diagnosis. But, even here, much of the research leading to the development of better techniques involves handling numerous cases which yield quantitative data and can be analyzed statistically.

The Biological Organism

Nervous system. If we are going to study the psychology of the individual and what he does, we need to know something about his equipment for this behavior. This necessitates a consideration of the biological organism. The simplest one-celled animal rolls along, hits a food particle, flows around it, and ejects waste material by merely flowing away from it. But as they come up the genetic scale organisms get more complicated, and they need connections between the different parts so that if something happens at one point (a harmful substance), another part (legs) will react. These connections are furnished by the nervous tissue which makes it possible for energy to travel from one part of the organism to another. The unit of the nervous system is the *neurone,* which consists of a cell body with branches, and these neurones are connected together in chains, or strings, which make up the nerves, and these, in turn, constitute the nervous system. This aspect of the organism is of especial concern to the psychologist because it is these neural connections that implement all the stimulus-response mechanisms in which he is interested, and it is in these connections, too, that the modifications of behavior take place when people learn to drive a car or memorize poetry. The nervous system connects sense organs with muscles. In man, it comprises essentially the brain and the spinal cord.

The spinal cord comprises long neural pathways connecting various parts of the body with the brain. Some of these transmit impulses from the sense organs to the brain, and others transmit from the brain to the muscles. Thus, if one steps on a painful object and is aware of it, the impulse goes up to the brain and then down to the muscle, and the foot is withdrawn. Frequently, the impulse does not go all the way up to the brain but cuts across in the spinal cord and returns to a muscle. This is called a reflex. A reflex can be observed if acid is put on the hind leg of a decapitated frog. The leg will withdraw or sometimes the opposite leg will move up and try to brush off the offending substance.

The brain is a more complicated mass of nervous tissue. It is a center for incoming and outgoing nerves and involves a tremendous system of interconnections, which make possible the great complexities of human behavior. Different parts of the brain are somewhat specialized. There are regions concerned particularly with hearing, vision, or movement, as can be demonstrated by removing a part of the brain and then noting what defects are manifest after recovery. However, these brain areas are not hard and fast. If one of them is injured, frequently another area will "take over"—what is technically called "vicarious functioning." For example, a white rat is taught a habit of following a certain pathway in a maze. Then a brain operation is made on him that disrupts the habit. It is found that the rat can relearn the habit by additional experience. Obviously, the habit was originally localized in the area involved in the operation, but later another area was able to assume the same function.

Another important point is that when a series of neurones is activated by some stimulus and then a response to that stimulus occurs, this process evidently does something to the neural connection. The response modifies it somewhat as though connections were being changed in an electrical circuit. This modification of the neural pathways forms the physiological basis for habit and learning.

Contacts with the Outer World

Stimuli. In the world about us there are many things called "stimuli" —sounds, colors, odors—that influence us or that produce sensation. Actually they may be vibrations of the air or ether, or chemical compounds, or mechanical impacts. At any rate, they impinge upon the sense organs, or receptors, which provide the actual contacts with the world about us. It will be noted later that among the stimuli to which we react are other people—social stimuli, hence, psychology is often considered to be a social science. However there is a biological aspect to it because people eat, sleep, drink, reproduce, and adjust to basic environmental factors.

Receptors. The stimuli from the outer world act upon us through receptors: eyes, ears, sense organs in the tongue, a sensitive area inside the nose, free nerve endings in the skin that give us pain sensations, special organs deeper in the skin for temperature and pressure, organs in the joints and muscles that are stimulated by compression as we move, and nerve endings in the inner ear where we get our perception of equilibrium. Actually, these receptors may be considered as part of the nervous system. When the organ is stimulated, the effect is transmitted through the appropriate neurones to the brain. At that point, we frequently become aware of the sensation, and the impulse goes through some cross-connections into a motor pathway leading out to some muscle or gland. There also are after-sensations. If we look at a bright red light and then close our eyes, we see green—red's antagonistic color. If we whirl and stop suddenly, we feel ourself going in the opposite direction.

Some of the sense organs have accessories to facilitate the reception of stimuli. The eye has a lens that, by changing its curvature, focuses the image on the retina. The ear transmits the vibration from the air through the eardrum and various connections to a watery liquid which vibrates too and finally sets in motion certain fibers in a membrane which, in turn, stimulate the actual end-organs of hearing. There are long fibers that vibrate sympathetically with a lower tone, and short fibers that vibrate with a higher tone. The sense organs for taste and smell operate chemically. The equilibrium organs in the ear are arranged so that a liquid moves in response to the inertia or momentum involved when the individual moves or stops and this liquid, in turn, presses upon the end-organs.

Stimulus intensity. The stimuli to which we respond differ in intensity: sounds are loud and faint; light is weak or bright. There is a basic question as to how the differences of stimulus intensity affect the receptor and the corresponding sensation. A stimulus, for one thing, can be too weak to be perceived. In the laboratory it is possible with refined methodology to determine the faintest perceptible sound, the weakest dilution of salt that can be tasted, or the smallest amount of light that can be perceived. This limiting point is called the "threshold." It involves the minimum intensity of stimulus that will excite a receptor.

There is a similar problem in determining how slight a change in intensity can be detected. This is termed the "difference threshold." Two weights that are almost equal are hefted to see if a person can tell which is the heavier. By varying the difference between them systematically it is possible to determine the difference threshold. This experiment leads to a basic law governing the relation between the difference threshold and the absolute intensity level involved. The difference threshold is a certain proportion of the absolute intensity. For example, it is necessary to make a sound physically about one third more intense in order to have it perceptibly louder, and a light must be about one per cent brighter in order to be noticed. That is the reason we do not see the stars in the daytime. The star is adding just as much to the brightness of the surrounding sky in the daytime as it does at night, but in the daytime it is adding only a very minute per cent to what is there; whereas at night it adds a large per cent. This principle is called the "psycho-physical law" or "Weber's law," after one of the first scientists who noted it.

Perception

Distinguished from sensation. Few of our contacts with the external world are in the form of sensation but most of them involve rather perception. Instead of merely sensing qualities such as redness or smoothness, we perceive an object such as an apple. Except in early infancy or under laboratory conditions we seldom experience pure sensation. Our perception is thus a combination of sensations or of stimuli organized into a meaningful whole. It is characterized also by a tendency to fill in the gaps. If we were unable to do this, we would miss a great deal in life. We hear part of the remarks over the telephone and infer the remainder. When we read a book, we do not look at every letter or even every word, but get certain cues here and there and fill in the rest. This can be demonstrated in experiments where words are presented in an apparatus for, say, a tenth of a second, misspelled or with letters left out, and the "subject"[1] will read them as though nothing had happened. To be sure, we often make mistakes in this way and fill in erroneous details, but without these short cuts the process of perception would be slowed down to a prohibitive degree.

Role of experience. Perception depends a great deal upon experience. We have to learn how to perceive. The infant reaches for the moon but soon learns the futility of the attempt. Blind persons learn to detect very slight auditory differences, for example, the reflection of the sound of their footsteps from a curbstone which they are approaching. Blind children at play have more collisions when, as an experiment, they are given felt slippers. If a person with congenital cataracts has a subsequent operation that restores his vision, the necessity of learning to perceive is exhibited most dramatically. Such a person cannot tell a cube from a sphere by looking at it. A more everyday instance of the effect of experience on perception is found in learning to read—the symbols on the page finally become perceived as words. It is possible to teach an anti-aircraft gunner to perceive correctly and identify almost instantly an approaching plane. Much of our early development consists of learning to perceive.

Space perception. One type of perception that deserves special mention is the perception of space. The world around us has three physical dimensions, and we have to learn to react to these correctly. For one thing, the image on the retina in the eye is upside down just as it is on a camera film. We have to learn to interpret this, and not reach toward the ceiling for the soup. This point was demonstrated in an experiment where a man wore glasses that actually turned the image over again so that things now "looked" upside down. Eventually he learned to respond correctly to this new perceptual relationship.

An important aspect of space perception deals with the third dimension. Part of this perception of depth is due to muscles of the eye, those that focus the lens by making it more convex or more flat and those that turn the eyeballs in or out as the distance of the object changes. We learn to interpret these muscle sensations to mean certain aspects of depth. Then each eye gets a slightly different retinal image. If a box is set corner-wise, the left eye sees a little more of the left side of the box and the right eye a little more of the right side. When two fingers are held up with the one at the right a little nearer, if we squint at them with the eyes alternately, they appear farther apart with the left eye. Either retinal image in itself is comparatively flat, but together they give the perception of depth. This same effect can be produced artificially in a stereoscope. Pictures of an object are taken with two cameras whose lenses are separated by a few inches. Then the stereoscope is arranged so that the picture taken with the right camera is shown to the right eye while the left eye sees the picture taken with the left camera. The ordinary hand stereoscope has a rack in which the two pictures are placed side by side with a screen down the middle so that the right eye cannot see the left picture and with prisms before each eye to deflect the light rays so that both pictures appear to come from the same central point. We then experience a picture with realistic depth because each eye gets the same impression that would result from looking at the real object. The same principle has been used in stereoscopic moving pictures. Two films are prepared with a double camera. The right and left films are projected on the same screen through red and green filters respectively. The observer wears red and green filters in front of the corresponding eyes so that the right eye sees the right picture. In another technique the two pictures are polarized differently, and the observer wears corresponding polarizing lenses.

---

[1] In psychological terminology the "subject" is the person on whom the experiment is being performed or the person taking a psychological test.

Some other factors which facilitate depth perception are size, clearness of the object, the interposition of other objects, and perspective. A large thing looks nearer because normally a near object produces a larger image on the retina. If the object is clear, we perceive it as near because that is in accord with ordinary experience; we sometimes are deceived by distant mountains in an unusually clear atmosphere. If one object obscures another, obviously it is in front of it, that is, nearer. In general, distant objects appear higher and this is basic to perspective.

Space perception includes audition as well as vision. If the source of sound is at the right side, it is somewhat louder in the right ear, and also hits that ear in a little earlier phase of the sound wave. We learn to interpret these differences in loudness or phase in terms of direction. If the sound is equidistant from the two ears, that is, with no difference in intensity or phase, it is difficult to locate. If a person closes his eyes while sounds are made at different positions around the head, and he is required to point to them, very frequent errors are made when the source is in the median plane. The source may be under his chin and he will point directly above his head.

Time perception. One other type of perception that deserves mention is the perception of time. We evaluate the lapse of time partly from our own activities such as numerous little muscle tensions, our breathing, and our heart beating. We learn to translate these usually faint stimuli into arbitrary units like minutes and hours. It may even be that general speed of life activities (metabolism) in our tissues gives us some cues. In an experiment where bodily temperature was raised several degrees artificially, that is, the subject "lived faster," his estimates of time intervals indicated that time went more rapidly than when his temperature was normal.[2] It is a very common experience that filled time goes more rapidly than empty time. Everyone has had time drag when he had nothing to do. When we are busy, we are less aware of these little muscle sensations, and hence less aware of time; whereas if we are doing nothing, we are more conscious of these sensations which mean time.

Attention has a marked influence on our perceptual contact with the outer world. Attention is an attitude or posture that facilitates the reception of stimuli. We adjust so that we are more aware of an object, and the object becomes clearer as an experience. If someone speaks to us, we turn our head and eyes, and adjust our whole mechanism so as to get more completely what he is saying. At any one moment, we are paying more attention to some things than to others. The former items may be considered as in the "focus" of attention and the latter in the "margin." Focus and margin tend to oppose each other. The more attention devoted to one thing, the less attention is available for something else. At one moment perhaps we are listening to a lecture which is in the focus of our attention. Then fire engines pass and they immediately leap into the focus, to the detriment of the lecture.

Attention is sometimes voluntary as when we deliberately sit down to study or to read a book. At other times it is involuntary when some stimulus catches our attention without any effort on our part. Certain kinds of stimuli are especially effective in this manner—loud sounds, bright lights, moving objects, large and unusual things, or an object that is isolated, such as an electric sign at night against a dark sky. Anything which interests us has ready access to our attention. If one is interested in baseball and someone starts talking about it, one immediately becomes alert. These tendencies for certain kinds of stimuli to get involuntary attention probably constitute part of our racial inheritance. Our potential ancestors who did not pay attention to the intense, large, moving, unusual stimuli probably were either devoured by the source of those stimuli or else missed an opportunity to secure necessary nutriment and failed in the survival of the fittest.

---

[2] François, M., "La Température interne comme facteur de variation de l'appréciation subjective des durées," *L'Année Psychologique*, 1927, 28, 186–204.

The range of attention is an important characteristic. This means that there is a limit to the number of things to which one can attend simultaneously. The conventional experiment involves an apparatus called a "tachistoscope" in which objects can be exposed for a fraction of a second. The experiment begins by flashing three digits; almost everyone can read them. Then four, five, and six digits are presented *seriatim.* By this time some subjects are having difficulty. With seven or eight digits most subjects are eliminated, and at nine or ten it is only the exceptional person who can read all the digits in a single flash. In other words, there is a limit to the number of things to which one can attend simultaneously. This has a practical bearing, for example, on the effective length of an advertising headline. It is possible, however, to increase the range of attention by specific training.

Another characteristic of attention is termed "accommodation." This has to do with the preliminary adjustment of attention prior to an event. If we are prepared in advance, we can attend to the object more effectively and react more efficiently. A sprinter starts much more promptly when the starter gives a warning signal prior to the gun sound. In laboratory experiments where we are measuring reaction time, that is, the speed with which a person can make a simple finger motion in response to a flash of light or a sound, we always give a warning a few seconds in advance of the stimulus so that the subject gets his attention accommodated.

Response to the External World—Action

We have noted some of the principles involved in making contact with the external world, and our next question deals with what develops as a result of that contact. The notion of stimulus-response is basic in psychology. At first we may distinguish several kinds of responses that a person can make without any learning. We shall then consider the modification of responses by experience.

Reflex. A relatively simple, unlearned type of response is the reflex. This involves a direct process in which the stimulus goes from the receptor into the central mechanism and out to the muscle. If the hand touches a hot object, it is immediately withdrawn. The neural impulse comes directly from the skin into the spinal cord, cuts across to another neuron, and goes out to the muscle, which contracts. Many of these reflexes are protective in nature. One gets away from harmful stimuli by winking, coughing, or withdrawing. Other reflexes save the life of the organism by contributing to nourishment, such as sucking or swallowing. Still others help preserve the species.

Reflexes sometimes can be facilitated by other factors. A simple demonstration may be made with the patellar reflex or knee-jerk. If the legs are crossed, the top one relaxed, and a sharp blow is given in the hollow of the knee, the foot kicks upward. Note should be made of the approximate extent of this motion. If the subject clenches his fists at the same time the stimulus is applied, the reflex will be exaggerated or facilitated. Conversely, it is possible to inhibit or reduce a reflex. If we touch a frog at one point, the legs will contract, and if we touch him at another point, he will croak. If we touch him at both places simultaneously, he will do nothing.

Not all reflexes are present at birth. A new activity may manifest itself when the bodily structure is ready for it, but not before. This tendency is called "maturation." A good example of this is tadpoles that were kept in an anesthetizing solution until they reached the age at which tadpoles normally begin to swim. A control group that hatched at the same time proceeded to develop without any anaesthetic. At the time the control group began to swim the other group was removed from the anaesthetic and as soon as they thawed out, began to swim as though nothing had happened. In other words, as soon as the bodily structure was ready the reflex could take place. Another instance of this process is the laboratory rat raised in complete isolation from other rats until he reached sexual maturity, whereupon he manifested normal sex behavior at the first opportunity.

Instinct is a more complicated type of response usually involving a series of reflexes which are somewhat coordinated. Food and sex are instances. The instinctive food response involves searching for it and killing it if necessary as well as eating it. There is some controversy among psychologists about instincts—just what they are and how many. There is, however, considerable agreement that they are innate or unlearned types of response that contribute to some biological end although the individual is not especially aware of that end. For example, a hen sits on an egg with no family aspirations, but nevertheless does contribute to the continuance of the species. A starving person snatches at available food and eats it without any metabolic considerations, but nevertheless does save his own life. Instinctive responses are usually quick, vigorous, and universal. A person responds immediately when someone steps on his toes, if he responds at all. He does not go home and write a letter about it later. The vigorous type of response is seen in a person's flight from danger, and the universal aspect is clear when we realize that anyone can be frightened. Psychologists disagree as to just how many instincts there are. Food, sex, self-preservation, flight, and curiosity are fairly well accepted. Some of the more doubtful instincts include constructing, play, and collecting. Whether some of these latter are instincts in the true sense does not make much practical difference because they are quite basic and quite universal tendencies, and we must reckon with them in our efforts to control human behavior. Instinctive responses, of course, are modified a good deal by experience. We learn to eat discriminatingly, and whereas originally we ran away from almost any unusual object, we gradually learn that some things are harmful and some are not.

Modifications of Responses—Adjustment and Learning

Trial and error. The first time we receive a stimulus we have to make some innate response, either reflex or instinct. But if we have that stimulus repeatedly, we develop a tendency to react in some habitual fashion. One method of forming habits is by trial and error. When we first mount a bicycle, we get sensations from the equilibrium organs in the ear and then we fall off. Presently we feel ourself tipping and try various things such as shifting our weight or turning the wheel, and we do not fall off as quickly. Gradually, we develop the habit of riding successfully, that is, of adjusting to the changes in equilibrium. This is an instance of trial and error learning in which a number of responses are tried at random, the successful ones are gradually fixed, and the others are eliminated. This method of learning can be observed more effectively in an actual experiment. Suppose we wish to teach a cat to escape from a small cage by pushing on a conventional door-button which, when moved from a horizontal to a vertical position, will enable a spring to open the door. The hungry cat is placed in the cage with food outside and the stop-watch is started. The cat then goes through a varied repertoire trying to squeeze through the bars of the cage, jumping at the top, clawing at the floor, reaching out with the paws, and making vocal responses. Sooner or later, presumably by accident, the cat hits the door-button, gets out, and has a bit of food. Then the process is repeated. The first trial may have taken half an hour. Gradually the time is shortened so that ultimately the cat will be out the door before the lid is down on top of the cage. This comparatively simple experiment epitomizes many things in the learning process of the trial and error type. We note for one thing the repetition of the successful response. Pushing the button occurred more frequently than pushing at some other particular point on the cage. This is sometimes termed the "law of use." We also note a principle of disuse, that is, responses which were less successful were gradually eliminated. The cat began to confine itself to one region and to claw at the sides of the cage rather than scratch on the floor.

Another point which is important is the effect of the response. The behavior sequence terminated with the attainment of some object capable of satisfying the drive, in this case, hunger. In everyday terminology, the cat was rewarded for the successful response. In some experiments the animal may be given an induction shock for doing the incorrect thing. It is not entirely clear just how the reward or punishment that occurs after the act has been performed works retroactively to facilitate the fixation of that particular response, but nevertheless it does. Numerous experiments demonstrate that rats will learn a maze more readily when they have food at the end of the maze. However, they can learn it without the food, although more slowly. Here again, it may be that they are driven on by the exploratory drive and that escape from the end of the maze does yield a little satisfaction, although not as much as the food. At the human level, encouragement or discouragement, that is, praise or blame, can be shown to facilitate learning. Persons taking some tests of coordination and speed in naming colors were given one attempt and then told that their performance was very good, and would they please try it again; or were told that it was a very poor performance, and were given an opportunity to try to do better; or were told nothing at all, but merely asked to repeat the test. The first group improved 89 per cent, the second 70 per cent, and the third 64 per cent. Obviously encouragement did help and so did discouragement but to a lesser degree. This principle is often termed the "law of effect."

Other factors play a role in learning of this sort but only one will be mentioned—incentive. It is to be noted that the cat was hungry. A satiated animal would not try as much, under those circumstances. At the human level we have such incentives as pay and competition spurring us on in acquiring a new skill in industry or athletics.

Conditioned response. Another type of learning is the conditioned response. This may develop at the reflex level, or with voluntary acts, or even with emotional responses. The classical experiment on the conditioned reflex was performed with the salivary reflex of dogs in a Russian laboratory. A slight operation was performed so that a salivary gland discharged outside the cheek rather than inside. By attaching a small tube to this fistula, it was possible to record the salivary secretion. As soon as the dog was accustomed to the experimental situation, food was presented and a bell sounded simultaneously. The saliva flowed, of course, in response to the food. After frequent repetition of the two stimuli together, it was possible to sound the bell and produce the salivary reflex without any food. That constituted a conditioned reflex, in other words, the bell had taken over as an effective stimulus for that particular reflex.

The same mechanism operates at a higher voluntary level in a person learning to drive a car. The beginner must be taught the exact time at which to shift gears. He accelerates in low, the instructor says, "Now!" at the appropriate time, and the beginner shifts. At the same time as the "Now!" however, he is stimulated by such things as the noise of the motor, the passing of the scenery, and his own subjective sensations of motion from the inner ear. After repetition of this performance, he reaches a point where the stimuli from the motor and the environment are sufficient to produce the gear shift at the right time without the spoken stimulus. The pattern is quite similar to that of the bell and the saliva.

Much the same thing occurs in the emotional field. It explains, for example, why so many people are afraid of snakes. There is no inborn fear of snakes. In some instances a young infant has been turned loose in a room with a six-foot snake and they got along all right. What usually happens, however, is that a child is out in the country with an adult, and when a snake is encountered the adult seizes the child, pulls him back suddenly, and makes some exclamation. All this frightens the child, and after it has occurred a few times, the fear of snakes has become conditioned. One of the classical experiments demonstrated similar principles with a young baby. At the outset a rabbit was placed in the baby's pen and caused mild interest and no fear. Then the experiment began. The child could be frightened by a loud sound, such as that produced by hitting a gong or a metal bar. When the rabbit was presented, this sudden auditory stimulus was also given. After a very few experiences, the child showed fear of the rabbit. This does not mean necessarily that it is possible to condition a person to be afraid of anything. As a matter of fact, this same experiment was tried with a pair of opera glasses, and it was impossible to condition a fear of the opera glasses. It appears that there are some stimuli that innately arouse a fear response, others such as animals that can easily be conditioned to arouse that response, and still other stimuli to which it is very difficult to condition a fear.

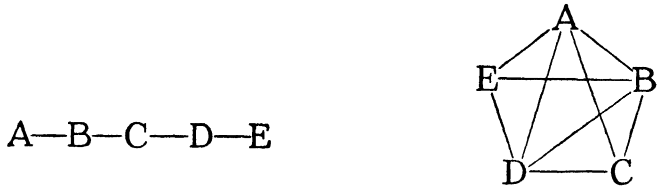
Insight learning. Another type of learning should be mentioned although we know very little about it. If a person or animal is working at a problem, he may hit the solution suddenly. An ape is reacting to a series of boxes arranged so that the second from the left of those available will lead him to food. He may go along for days and hit only one or two out of ten, and then he suddenly makes a perfect score. At the human level we would verbalize the problem. No one knows just how the ape gets it. It has sometimes been termed an "a-ha experience." It probably is preceded by a period of trying tentative solutions in imagination and then the correct one comes suddenly. This is termed "insight learning."

Modifications of ideas—memory. Modification of response takes place also at the higher levels where ideas rather than the larger overt muscles are involved. Memory is essentially this type of modification. It is based primarily on association. One experience calls up another. Two times three reminds us of six, a face calls back a name, a shotgun suggests hunting, and a toothache causes us to think of the dentist.

There are two basic principles or laws of association. One is the principle of contiguity, which means simply that a stimulus tends to call up something else that has been experienced contiguously with it. Two times three calls up six because we have experienced those two things *together* many times. The other basic association principle is similarity. A photograph reminds us of a face because of the similar configuration.

These two principles, however, are not enough to explain all the details of association. This may be demonstrated in an experiment in which a stimulus word is given and the subject responds with the first word that occurs to him. It is well to record the time of response, not merely for the purpose of analyzing the reaction times, but also to be sure that the subject really gives the first word. If the stimulus word is "cigarette," the subject probably will respond by naming some brand. Then the question arises as to why he mentioned that particular brand. The principle of contiguity would not suffice to explain it because in the past he probably has experienced a dozen different brand names contiguously with "cigarette." Some further principles must determine just which one of these previously contiguous associations prevails. One such principle is frequency: it might be that he had experienced this particular brand much more frequently in connection with cigarettes than any other brand. Another principle is recency: perhaps he had just been using one of them, or had just heard about, or had just read, an advertisement for the brand. A third factor is primacy: the name he gave might be that of the first brand he had ever smoked. Another principle is vividness: the two experiences may have been connected under vivid circumstances; perhaps the cigarette brand had been strongly emphasized in a sales talk. These secondary principles thus supplement the more basic laws of contiguity and similarity.

Special mention should be made of one other type of association called "constellation." The more common type of association is serial, that is, the first word of a poem leads to the second, this in turn to the third. If we designate the items associated by letters, then schematically the situation would be as indicated below at the left. In the constellation type of association each item is associated with every other one rather than with the adjacent one, as at the right. The following diagram illustrates the distinction.



Serial *Constellation*

This means that any item in the constellation is liable to call up any other one, and when some particular one is forgotten, the others may converge upon it and facilitate its recall. The everyday instance of this is found when a person goes into another room for a purpose and then forgets why he went there. He usually can recall it by going back to the first room. Originally he was stimulated by a number of items—an article in a magazine, a note on his calendar, and a photograph—all of which were somewhat associated with going into the other room for a certain book. These items form the constellation. When he reaches the library, the surroundings are insufficient to remind him of the book, but if he goes back to the original situation, he sees the magazine, the memo, and the photograph which were in the constellation that set him off originally. Then he remembers the book. These constellations often get centered around a suppressed wish, and in that case we have a "complex" which plays quite a role in psychoanalysis.

Thus we see that memory depends on association and involves such principles as contiguity, frequency, recency, and the like. There are, however, other factors that facilitate memory. One of these is termed the "organization process." It deals with what happens immediately after an attempt to learn something. The conventional experiment is to learn a list of words under laboratory conditions and sit passively doing nothing for a minute afterward; other lists of comparable difficulty are followed by mental arithmetic for a minute. When subsequent check is made on recall for the two lists, the one followed by the passive period is distinctly superior. Apparently something takes place after the learning. It is as though the materials had to settle down and get organized or integrated in order to be retained most effectively. Similar results may be seen in cases where a person has an accident, is knocked unconscious, and cannot recall details just preceding the accident. The items obviously did not have a chance to get settled down and organized because they were upset by the shock during that period when organization normally would be taking place.

A somewhat related factor is the distribution of learning. Suppose we were to go over certain material a dozen times. We can compass the entire dozen in succession, or six today and six tomorrow, or only one or two a day. Much experimental work has been done upon this problem with both animals and humans. The results are conclusive that, up to a certain point, the distributed repetitions are better. They allow the material a chance to organize between times so that there is a greater economy from the standpoint of the total amount of time expended.

Another factor is the intention with which a learning situation is approached. We can ask a subject to learn two lists of words. With one list he is told that he will be asked to recall the words in half an hour, and with the other list he is told that he will be asked to recall them a week later. Subsequent check on both lists indicates that he actually does retain them better when he learns them with the intention of remembering them for a longer period.

In many situations it is more effective to learn material in large units rather than piecemeal. If we learn a poem line by line we then have to go back and piece the lines together. By going through the whole poem repeatedly, we are not only getting the requisite number of repetitions on each line, but we are also forming the connections between the lines. If the poem is too long and we get discouraged at apparent lack of progress, it may be advisable to break the whole up into a number of good-sized units.

It can also be demonstrated that learning is more effective if there are frequent efforts at repetition or review. Occasionally reading the thing out loud will help reinforce it by getting several sense departments involved.

One other consideration in connection with memory is the converse process of forgetting, which takes place very rapidly at the outset, and more slowly later on. If material has been just barely learned, one may forget as much in the first half-hour as in the next week. If, however, the material has been overlearned, that is, given more repetition than necessary for immediate recall, then the retention will drop off less rapidly. When several repetitions are made, there should not be too much time between the early ones. If a long period elapses after the first presentation, we practically forget everything before the second repetition and have to begin all over again. That is why it is advisable to review the content of a classroom discussion right after class instead of waiting until the next day. By the same token, in advertising mail order business it is better to follow up early rather than several weeks after the initial mailing.

Drives and Motives

We have discussed how man reacts to the world about him. The question then arises as to *why* he does this. Something usually is there to urge him on to win a bridge game, to pass a course, or to do a good job. These mainsprings of action are termed "drives" or "motives."

Drives comprise basic stimuli that persist until something is done to remove the stimulating conditions. They usually represent such conditions as go with fundamental bodily needs like hunger. When the muscles contract in the stomach, they yield a sensation, and we attempt to do something about it. This activity continues until we eat. We are restless and active in the process of seeking food. The sex drive operates in similar fashion. Other common drives are thirst, pain, lack of adequate oxygen, fatigue, extremes of temperature, and, to some extent, the exploratory drive—the tendency to ascertain where we are. A white rat in new surroundings is notorious for that exploratory tendency.

Motives. Psychologists differ in their terminology, but a frequent consensus is that when the individual knows what the drive is about, knows what to do, and sets up some habits in connection with it, then the drive becomes a motive. We are driven in a primitive way by the hunger sensation, but we are motivated to get a job and earn some money, so that we can buy food. The motive is more apt to operate in a social situation. We may think of the drive as biological and the motive as social; however, it is unnecessary to draw the line too sharply. Whether it is a drive or a motive, there is something urging us on to make various responses to our environment. The role played by motivation in learning has been mentioned already. The hungry rat continues traveling through the maze in an effort to escape, whereas the satiated rat takes a nap.

One other technical term should be mentioned. When the individual becomes definitely aware of the goal of behavior or is obviously working toward some goal such as food or escape, we speak of the behavior as "goal directed."

Strength of motives. It is obvious that motives differ in strength. A starving person will react more vigorously than one who is only slightly hungry. Experimental techniques have been developed to measure the strength of various motives. For example, we place a laboratory rat in a situation where he can get access to food by crossing a grill that is charged electrically. We keep a constant voltage on the grill throughout the experiment, and then try him after fasting one, two, or three days, to determine how long a period of hunger is necessary before he will take the punishment involved in getting the food. It has been shown, also, that rats will form a maze habit more quickly with increased amounts of hunger up to a certain point, beyond which they react in too frantic a fashion to learn effectively.

Typical motives. Some common motives have already been mentioned and others will be discussed in connection with problems of school or industry. Salary or pay motivates almost every adult. It is complicated psychologically, for the pay is usually a token or some other thing that is desired. Even monkeys have been taught to operate a mechanism that finally yielded a poker chip, which in turn could be dropped in a slot and produce a bit of food. Another common motive is competition. It probably goes back to the basic tendency to preserve one's own life and fight off the opposition. This supposition is borne out by the fact that competition as an individual against other individuals has been proved more effective as a motive than competition as one member of a group against another group. This result was found under laboratory conditions and should not be confused with the fact that a football team will operate vigorously in the stadium. The presence of the crowd introduces a variable that is not present in the laboratory.

Knowledge of results is another motive. A person likes to know how he is getting along. A teacher of a college course once graded all his examinations and quizzes either "Satisfactory" or "Unsatisfactory." The students didn't like it at all because they wanted to know just how satisfactory their performance was. In helping a person recover the use of some paralyzed muscle group, it may be a matter of providing extreme motivation and tremendous effort in the hope of thus breaking through some parallel neural pathway to that muscle. This is often facilitated by an arrangement in which, if the patient moves the member ever so slightly, the motion is tremendously amplified by an apparatus with a moving pointer, and thus he is encouraged by this knowledge of success. Praise and blame have already been mentioned as motives and their effect on the second performance of a task noted (page 22).

Prestige is another motive. This also is related to the tendency toward self-preservation. We like to get ahead of other people. We like to be admired by them, either for our prowess in some particular line or simply for our appearance or dress. Other motives that are effective with some people, but not with all, are the desire to help others, or to make friends, or to cooperate, or, perhaps, on the highest plane, altruistic motives.

Conflict of motives. It is inevitable that a person should sometimes be subjected to conflicting motives. Two things which he wishes to do are incompatible. Perhaps he wants to pass a certain college course, but also spend enough time practicing so as to make the team. He may wish to buy a car and a washing machine, but be unable to finance both. He may wish to be successful in business but also to have plenty of leisure time for fishing. These conflicts are often unpleasant and are the cause of many mental maladjustments. Usually some choice is made by balancing the alternatives that will result from each course of conduct. A person may be clever enough to get both alternatives, but more frequently there are ineffective solutions and mental maladjustments. For instance, a person spends his time daydreaming and gets his unattainable desires in revery to the detriment of his other work. A youngster compensates for intellectual inferiority in school by becoming a bully. Someone may even circumvent a conflict situation by hysterical paralysis so that he is unable to do the unwanted task at all. These maladjustments resulting from emotional conflict will be discussed in some detail in connection with mental hygiene in a later chapter.

Emotions and Feelings

Feeling *versus* emotion. Many of our experiences are toned with moderate amounts of pleasantness or unpleasantness. The smell of honeysuckle coming in the window is faintly pleasant, whereas the noise upstairs is disagreeable. When the feeling tone becomes more pronounced, the experience shades over into emotion such as joy, fear, anger, or grief.

Disorganized response. An outstanding characteristic of emotion is its disorganized nature. It is an inefficient type of response. If a boxer becomes angry, he swings wildly and leaves his chin open. In a panic, a person runs in all directions. If one meets emergencies with less emotional reaction, one is more apt to be successful in those situations.

Bodily response. The subjective experience of emotion is influenced by the activities of the muscles or glands. Most of us have had the experience of walking along a dark road at night and feeling that we are being followed. We quicken our pace, but that does not relieve the fear. In fact, the faster we go, the more frightened we become. This tendency led one of the early psychologists to make his famous overstatement that we are afraid because we run and are sad because we weep. This epigram goes too far, but it is suggestive of a trend. Although the muscular or glandular response may not be the whole story, it nevertheless does have a marked influence on the emotion. It is difficult to get angry when one is fully relaxed. The melodrama is not so utterly excruciating to a member of the audience who forces a smile on his face.

Endocrines. The emotional experience is also influenced by the ductless glands, that is, those which discharge into the blood stream rather than outside. In fear and anger especially there is activity of the adrenal glands near the kidneys. These secrete a substance into the blood stream and its presence can be demonstrated experimentally by letting a dog bark at a cat, and examining samples of the cat's blood before and after the experience. The secretion of the adrenal glands has a specific effect on the vascular system. It sends blood out to the muscles, taking it away from the viscera, and it increases the sugar content of the blood by drawing sugar from the liver. It also increases the tendency of the blood to clot or coagulate. These three features have an obvious relation to the apparent emergency confronting the cat even though in the laboratory the dog is tied. The greater blood flow to the muscles supplies more fuel to them and muscular contraction is essentially a matter of burning up (oxidizing) sugar products (fuel). The increased sugar content of the blood also makes more energy available in the muscles where it is needed. Finally the greater coagulability of the blood would be an advantage if the animal became wounded, and would minimize the probability of hemorrhage. These facts have led to the so-called "emergency theory" of emotion; namely, that the emotion prepares the organism from a physiological standpoint for effectively meeting the emergency. The disorganized character of the emotional state, however, would work in the opposite direction. These ductless glands, incidentally, are controlled through the autonomic nervous system, which is another system running alongside the central nervous system and connecting with it at various points. The autonomic system functions especially in emotional conditions.

Aptitude and Proficiency

Differences between individuals. Historically, the psychologist was first concerned with the general principles of human experience and behavior. However, when he was experimenting on memory, for example, he noted that under the same conditions some people excelled others in remembering digits; or in a reaction time investigation, some persons could consistently press a key in response to a flash of light one or two tenths of a second more rapidly than could others. Such findings suggested the importance of basic differences in aptitude. One person simply has a higher ceiling in a particular kind of performance, and with some characteristics, at least, this is an inborn capacity. One cannot change one's reaction time very much by practicing it. True, many functions show some effect of practice but the limit attainable by the individual after adequate practice is set by heredity.

Special aptitude tests. One of the big developments in applied psychology has been the building of aptitude tests to measure such characteristics as memory for numbers, reaction time, speed of association, attention, ingenuity, mechanical aptitude, or dexterity. A test is essentially a sample of behavior. A subject, for example, goes through a page of numbers and crosses out every 2 and rings every 3 until he comes to a 7, then he crosses the 3 and rings the 2 until the next 7 and continues this for five minutes. This requires a high degree of alertness, and it is assumed that his performance in this brief sample of behavior is typical of his alertness on the job, for example, when he is inspecting roller bearings. It should be added that this assumption is in the nature of a hypothesis. What the psychologist actually does is give the test to the inspectors and compare their test scores with their efficiency on the job. Only then does he know whether the test measures what he hopes it does, and only then can he use the test in the employment situation to predict effectiveness as an inspector (*cf.* page 414).

General aptitude or intelligence tests. In addition to the special aptitudes just mentioned, people possess a more general capacity which has profound vocational and social significance. This is sometimes called "intelligence," and it marks the difference between the genius and the idiot. A scientist's notion of the actual nature of intelligence depends upon the interest with which he approaches the problem. If he is biologically inclined, he thinks of it as ability to adapt one's self to one's environment. If he has a physiological slant, he may consider intelligence as plasticity of the nervous system and facility with which new connections can be formed. If his interest is statistical, he may think of intelligence as an abstract general factor that underlies the fact that, if persons take a wide range of tests, those who do well in one test tend to do well in many of the other tests and *vice versa.* If he approaches intelligence with practical everyday interest, he probably thinks of it as general alertness, ability to catch on to things, to get the directions the first time, and, in general, ability to achieve a little higher status and be a little more successful in almost any line of practical endeavor. Numerous tests presume to measure this general characteristic. It will be pointed out later that regardless of different notions about the ultimate nature of intelligence, these so-called "intelligence tests" have been found to predict success in school, and in some types of vocation. Utility is more important than nomenclature.

Proficiency. Besides varying in measurable aptitudes, individuals differ likewise in proficiencies that they have acquired—such things as hitting a ball, operating a typewriter or a milling machine, or, at the more intellectual level, doing arithmetical computation or being familiar with geographical facts. Numerous tests for these proficiencies quite analogous to aptitude tests have been developed. Such tests are useful in many educational problems.

Personality

Popular use. Certain characteristics of the individual that have not been covered by the foregoing discussion are often subsumed under the term "personality." The term has many shades of meaning. Popular use of it is vague and ubiquitous, and may range from Mayflower ancestry to configuration of lipstick. The psychologists themselves use the term in various ways, but a few of the more common notions will be mentioned.

Total individual. One widely held notion is that personality connotes the entire equipment of the individual. It includes about everything—his sensory equipment, intellectual characteristics, emotions, motives, habits, attitudes, skills, and over-all effectiveness. This is not a very useful concept except in so far as it is possible to summarize all that is known about a person under this definition.

Social stimulus value. Another frequent notion is that personality connotes the way a person impresses other people. This puts it specifically into a social situation, and emphasizes the social as contrasted with the biological aspect of the individual. It involves such things as getting along with people and selling one's self. This aspect certainly is important in many practical situations—in public relations work, in contact with the public, in selling, in many of the professions, and in marriage.

As contrasted with aptitudes and ability. Some psychologists define personality largely by way of contrast to aptitudes and abilities. The emphasis here is not so much on what a person *can* do (aptitude), but on what he *will* do. It is a matter of how he goes at things. For example, he may have good intellect but be lazy. He may have good business ability but annoy everybody. This puts personality especially in the field of attitude, emotion, and motivation. Sometimes we go so far as to think of particular traits of personality. This notion fits in well with the psychometric problems of measuring individual differences with a view to predicting vocational or other effectiveness. Personality tests as contrasted with aptitude and proficiency tests make sense.

Components of personality. More research is needed before it will be possible to indicate with some certainty the dimensions of personality. The following characteristics, however, are widely discussed and efforts to measure them have been fruitful.

Introversion-extroversion is the tendency of a person to live within or without. The extreme introvert crawls into his shell, daydreams, and does not mix with people, whereas the extrovert gets out with folks and likes it. People do not divide sharply into one class or the other. Introversion-extroversion is a *continuum* extending by imperceptible gradations from extreme introversion to extreme extroversion. A given individual may be thought of as located at some point along this *continuum*. Another common classification is dominance-submission. Some people tend to take charge of the situation and impose their desires upon others, whereas the submissive person does what he is told and lets someone else take the lead. It should not be assumed that the individual remains forever at the same point on the *continuum*. An extrovert may suffer a traumatic disappointment and crawl into his shell; a not very dominant officer candidate may develop leadership qualities. General emotionality is often a significant trait. Some people, for example, fly off the handle very readily and almost anything will stimulate them; they are sometimes called "choleric." Others are very slow-moving in the emotional sphere; they are called "phlegmatic." Still others tend to get frustrated very easily.

Another approach to personality relates it to various psychopathic conditions. A hysteroid personality, although not seriously abnormal, does show a trend toward the kind of emotional behavior manifested in hysteria. The schizoid personality has a trace of the tendency to go in all directions that characterizes the actual schizophrenic.

Another characteristic that is receiving some study of late is the level of aspiration. This deals with a person's confidence about his capacity to accomplish some particular endeavor. Some people consistently set their goal too high, whereas others consistently underestimate their abilities. There is an aspect of personality that shades over into the field of character traits, such as honesty or altruism. The foregoing are just a few of the characteristics of individuals that are often subsumed under the notion of personality.

Measurement of personality. The measurement of these personality traits has given the psychologists a good deal of trouble. It is not as simple technically as measuring aptitudes or proficiencies. Many of the conventional personality tests involve asking a person what he would do in certain hypothetical situations; for example, if he were late to a lecture where there were no seats in the rear, but plenty down front. In some situations, the subject answers those questions truthfully and the result may be diagnostic. In other situations, however, such as in an employment office, one is inclined to give what one thinks is the best answer rather than the answer that really characterizes one. This point will be amplified later when we discuss personality and other tests with reference to vocational adjustment.

Individual Differences

Normal frequency distribution. An interesting aspect of the measurement of aptitudes, proficiencies, or even personality, is the difference between individuals. If we give a test to a considerable number of persons, and want to know something about the trend for the entire group and how a given individual stands compared to the group, it is convenient to plot a frequency distribution curve. The nature and implications of this curve can be best be illustrated by a concrete example. Figure 1 gives a normal frequency curve for the intelligence test scores of several hundred students. The scores have been grouped in classes of ten and

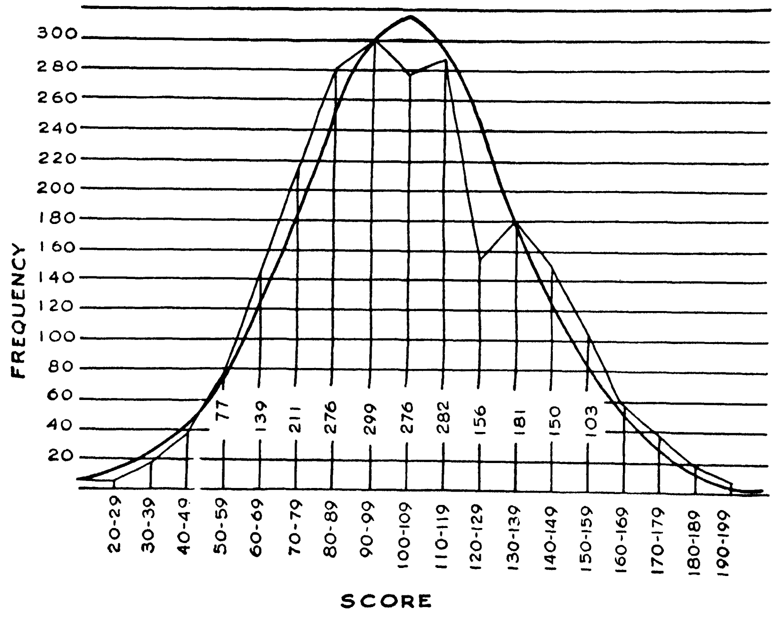


Figure 1. Normal Frequency Curve for the Intelligence Test Scores of Students.

appear along the base line of the figure. For each of these classes a perpendicular has been erected, the height of which is proportional to the number of students making that score. For example, 77 students scored between 50 and 59 points in the test, 139 scored between 60 and 69 points, and so forth. The line joining the tops of these perpendiculars constitutes the frequency curve. This curve shows a trend that is very characteristic in human measurements. A great many of the students are located in the middle of the distribution, somewhere near the average. As we go above and below this central portion, the frequencies decrease more or less symmetrically. The ideal normal frequency curve is more like the heavy one in the figure which has been smoothed statistically. This prevalence of mediocrity and decreasing frequency as we go toward both extremes is very characteristic. This type of curve is found very frequently in psychological measurements. We get it with intelligence tests and with almost any other kind of test that is given to a large number of people. It is also found when we measure the height of a large sample of persons. We would find it if we plotted daily temperatures from weather reports in a given region; or if we took a large number of leaves from a tree and measured their diameter. We would even get a similar curve if we took ten coins and tossed them thousands of times and then plotted the frequency with which we obtained all heads, 9 heads, 8 heads, and so forth. Obviously, this normal frequency distribution characterizes a great many things in nature. For our purposes, the expectation is that if we measure some human characteristic, we are more apt to get a normal frequency curve than any other type.

Uses of distribution curve. When we have measured a group of people in some respect and plotted a curve like that in Figure 1, we can discover a number of points of interest. For one thing, we know the general level of this group with which we are working. More than that, we know whether the persons are closely grouped around the average, or whether they are widely scattered, whether we have a homogeneous population or a heterogeneous one, which information may often be very important. Then we can evaluate any given individual's standing relative to the entire group. We simply go along the base line until we find approximately his score, and if we erect a perpendicular at that point, we can determine what proportion of the group is above him and what proportion is below him. It is often of further interest to note the general shape of the curve. Sometimes it is not symmetrical, as indicated here, but is skewed with the high point considerably off center. We then have to interpret this skewness. We might, for example, have an unusually intelligent group of applicants for a job take our test and the high point of the curve would not be at the middle but somewhat to the right. Another use of these curves is comparing two different samples. If one distribution curve is for men and another for women, it is possible to see to what extent they overlap, and whether differences between the averages of the two sexes really are significant.

You simply cannot make a genius out of a moron. It is well established that practice does not entirely eliminate individual differences such as we have been discussing. These differences are partly due to heredity and partly due to training. However, these individual differences are of profound significance in applied psychology.

Summary

This chapter was designed for the reader unfamiliar with the field of general psychology. The scientist extends the interest in psychology that everyone has by making more observations under better controlled conditions. Historically, psychology has progressed from the arm chair to the laboratory with increasing emphasis on a quantitative approach and on objective rather than subjective techniques. The psychologist is concerned with the biological organism with its nervous system, consisting of spinal cord and brain, which makes it possible for impulses to be transmitted from one part of the organism to another. Contacts with the stimuli from the outer world are possible through numerous receptors. The simple sense experiences are organized into more complicated perceptions, and the individual learns to perceive the objects about him as well as more complicated things like printed words. In space perception he learns to interpret the muscle sensations of the eye or the disparity in the images received by the two eyes to mean depth. In the auditory field he perceives the location of sounds by their relative intensities or phase differences at the two ears. Time is perceived largely by the muscle tensions taking place during a time interval. Perception, moreover, is influenced markedly by the attention devoted to stimuli. Such characteristics of stimuli as size, intensity, contrast, and motion are effective in arousing involuntary attention.

When he is receiving stimuli from the external world, the individual responds to them with some form of action. The simplest innate patterns are reflexes and instincts. The former involve direct transmission of the impulse from the receptor into the spinal cord and out again to the muscle. Instincts are more complicated, involving an organization of reflexes. Responses often become modified by experience. Trial and error learning promotes varied responses and the more successful responses gradually are selected. Conditioned response learning involves transferring the response from one stimulus to another which has accompanied it. Insight occasionally takes place in learning. At the higher intellectual level there is a similar modification of ideas in the form of memory, which is based largely on principles governing the formation of associations.

Drives and motives underlie much of human behavior. The former involve stimuli that persist until something is done to remove the stimulating condition. When the individual knows what the drive is about and organizes responses in connection with it, the result is a motive. These motives vary greatly in their strength and effectiveness. Typical ones center around food, sex, self-preservation, and competition. When conflicts between motives occur, mental maladjustment often results.

Many experiences are toned with pleasantness or unpleasantness, and when these experiences become more extreme the feeling shades over into an emotion such as fear or anger. These are characteristically disorganized types of response and are influenced markedly by the bodily activity that accompanies them. The endocrine glands have an especial function in some of the emotions and tend to put the organism on an emergency basis.

The psychologist, and especially the applied psychologist, is interested in the differences between individuals that are found in many mental characteristics. Among these differences are the innate capacities and the acquired abilities. It is possible to devise tests to measure them. Personality is another aspect needed to round out the study of the individual. It is sometimes considered as the total individual, sometimes as his social stimulus value, or sometimes as a characteristic that is contrasted with aptitudes or abilities. Tests of a sort have been devised to measure it. If a number of people are given any type of test, the best way to obtain a notion of the individual differences is to plot a frequency distribution curve. For most types of measurement in psychology this follows the normal frequency curve which has a high point near the average and decreases symmetrically toward both extremes. These individual differences are of great significance in applied psychology.

3

PSEUDO-PSYCHOLOGY

The Psychological Underworld

MANY THINGS ARE called "applied psychology" that are as remote from that science as horoscopes are from Mount Wilson Observatory, or Kickapoo Indian Sagwaw from the Mayo Clinic. It is easy to find practitioners who, for a fee, will diagnose a person on the basis of his birthday, the number of letters in his name, the lines on his palm, the bumps on his head, the size of his ears, or his complexion. They will fall into a trance and connect him with his ancestors in the spirit world. They will drill him in concentration, "vibrate" with him in therapeutic capacity, or "read" him in some other inscrutable fashion. No problem is too difficult for them; their results are infallible; and practically all of them are "renowned psychologists." It is on this last point that real psychologists have a just complaint. If the cult was labeled "galomalism," or "volotherapay," the scientists could not protest so seriously. But the stuff is called "psychology" and the layman tries it. Then when his memory fails to improve, or his salary is not raised by the ritual of assuring himself between deep breaths before an open window that he is a success, or when the new salesman does not produce to the extent that was indicated by the protruberances on his skull, or when the blonde secretary does not manifest the personality traits that are supposed to accompany that complexion, then psychology gets the blame.

The motive for this psychological underworld is, of course, commercial. The word "psychology" is an abracadabra for the purveyor of questionable advice. To many persons psychology is surrounded with mystery, smacks of the occult, and intrigues their imagination. Thus it constitutes an effective attention-getting device and selling point for many of these gold bricks.

Almost anyone is likely to encounter pseudo-psychologists. Therefore, it is well at this point, before discussing what psychology actually can do in practical human problems, to indicate first what applied psychology cannot do, and to refute some of the claims of the pseudo-scientists. Some readers may make a contribution to social welfare if they have the opportunity to employ this material in disabusing an acquaintance of erroneous notions about applied psychology.

Pseudo-psychologists operate primarily in three fields: guidance, personal efficiency, and therapy. These three will be discussed in order, although some of the techniques to be described are ubiquitous.

Astrology

Although astrology, which deals with the position of certain stars at the time of a client's birth, seems fairly remote from psychology, it is mentioned at this point because it attempts to operate in a practical field where psychology has a contribution, namely the field of vocational adjustment. The writer knows the employment man in a good-sized industrial concern who will never hire for a certain dusty job anyone whose birthday is in the spring. A successful radio program ran for a considerable time featuring astrological advice about vocations and personal problems. The writer and a colleague from the astronomy department once burlesqued this program over a local station, but some people took it seriously.

If one attempts to evaluate astrology, one is immediately confronted with the fact that no theoretical interpretation of these alleged relationships between the stars and human behavior has been suggested. The case is usually "proved" by analyzing some well-known person retroactively. Hindsight is so much easier than foresight! A real investigation of the problem could be made statistically by tabulating the birth dates of persons who have been successful or otherwise in various vocations, and comparing the data with the claims of astrology. The absence of any such investigation is somewhat of a refutation of the entire technique.

Spiritualism

Assumption. Another pseudo-scientific field which attempts guidance and counseling and whose shortcomings are often laid at psychology's doorstep is spiritualism. The basic notion is that, by transcending space and time, it is possible to get a broader point of view, comprising both past and future. It is somewhat analogous to observing the course of an automobile from an airplane. It is possible to see the road the car has traveled thus far, but also to see some of the things the car will encounter farther down the highway. The spirit world is supposed to be on the dark side of the earth, and from that vantage point, in some inscrutable fashion the departed can get this all-inclusive view. Incidentally, this particular location makes it easier for the spirits to attend séances in the darkness.

Techniques. The technique of tapping the spirit world is fairly obvious to a careful observer. General suggestions are propounded, and anyone who appears interested gets the message. It is necessary merely to help the medium along a little. The writer has received messages in this way from a departed friend named Brooks, although the medium seemed to get the message from Briggs, until the writer asked if it couldn't be Brooks. It is the familiar hot and cold technique.

Futility until telepathy can be demonstrated. There is one weighty objection to the acceptance of spiritualism as a scientific fact. There is no presumption that a mind in this world can communicate with one in the spirit world until it is proved that two minds in this world can communicate without some physical medium such as light or sound. Telepathy has been the subject of some experiment and more controversy. A typical experiment involves some such material as cards bearing different symbols. One person, usually called the "agent," observes these in a random order and tries to transmit them to the other person, the "percipient." Many variations of this procedure are possible, but the essential point is to note the frequency of success on the part of the percipient in comparison with the probability of guessing the correct answer purely by accident. Early experiments along these lines showed quite consistently negative results.[1] Some more recent experiments have claimed positive findings.[2] The results, however, have been criticized on many grounds, especially mathematical. One investigator demonstrated photographically that many of the cards used in the experiments in question were printed in such a way that they could be read from the back. Another question is whether each judgment made by the percipient is independent of previous judgments. If, for example, one has guessed "hearts" three times in succession, one is not so inclined to make the same guess the next time. It is difficult to take account of this cross-influence of psychological judgments in evaluating the results statistically.[3]

One frequently encounters claims of individual instances of telepathy.

---

[1] Coover, J. E., "Experiments in Psychical Research," Stanford University *Publications,* 1917. Also Troland, L. T., *A Technique for an Experimental Study of Telepathy and Other Alleged Clairvoyant Processes,* 1917 (published privately).

[2] Rhine, J. B., *Extra-Sensory Perception.* Boston: Bruce Humphries, 1934.

[3] For a critical review including some of these objections see Rogosin, H. M., "Evaluation of Extra-Sensory Perception," *Journal of General Psychology,* 1939, 21, 203–217.

Observations under uncontrolled conditions mean nothing to the scientist. Many alleged cases of telepathy are due to what is termed "minimal cues." For instance, a little girl in Rhode Island was quite successful in naming a card that her mother was observing. They had been playing with cards for years and had apparently built up some type of unconscious signals—possibly a little shift in posture, or a little change in breathing, or some involuntary movement that occurred at the time a given card was shown, which they had both gradually come to associate with the particular card. This was demonstrated clearly enough by some simple experiments in which they sat a few feet apart in the same room and made a rather high score, and then sat a few feet apart with a solid wall between them and had a complete failure.

It is not worth while at this point to go into the extensive studies in this field. Attention is called, however, to a survey made to get the consensus of psychologists. Out of 352 who replied, only 1 per cent believed extrasensory perception was an established fact, 7 per cent considered it a likely possibility, 33 per cent a remote possibility, and 14 per cent an impossibility, and the remainder thought it was merely an unknown.[4] This sample of reputable psychologists evidently is still open-minded as to the possibility that it might be demonstrated, but very few are ready to subscribe to it now. The point in our present connection then, is that until telepathy has been demonstrated conclusively, there is no sense in worrying about spiritualism. People who accept counseling from the spirit world are flying in the face of science, and putting themselves at the mercy of some unscrupulous medium.

Graphology

Assumptions. There is considerable commercial exploitation of handwriting for diagnosing and advising people. The best market is in helping employers screen applicants. Most of the generalizations are based on analogy. It is assumed that writing continuously from letter to letter denotes coherence of thought; whereas a person with flashes of inspiration is apt to write discontinuously. Heavy writing is supposed to denote persistence, and bold writing, imagination and ambition. These conclusions are not based on empirical studies. Even the assumption that neatness in writing connotes general neatness is open to question. Habits are specific rather than general.

Experiments on graphology. The acid test in this, as in so many other alleged scientific fields, is an empirical one. It is not too difficult to analyze specimens of handwriting according to the accepted procedures and see how the results compare with known characteristics of the individuals who submitted the specimens. One such study investigated such claims as that ambition is associated with upward sloping lines, bashfulness with fineness of lines and narrowness of m's and n's, forcefulness with heavy lines and heavy bars on the t's. Some seventy students in a medical fraternity rated one another on the traits involved, and each one copied a selection on the same kind of paper with the same type of pen. These specimens were measured in detail according to the graphological criteria specified, and the results of these measurements correlated with the actual traits as rated by acquaintances. The correlations between the handwriting data and the estimates made by acquaintances ranged from .38 to -.20 and two thirds of them were negative (the significance of correlation coefficients will be discussed in a moment).[5] In another case judges estimated the intelligence of a large number of students on the basis of samples of their handwriting. The correlations between these estimates and an actual intelligence test ranged from .16 to -.16.[6] Another approach is to see what the graphologists themselves can do in matching up specimens of handwriting with the psychological characteristics of the writers. Incidentally, many of the published "proofs" of graphology involve analyzing the writing of some famous person whose characteristics are already known to everybody. One investigation utilized character sketches of ten men that had been prepared by three psychologists who knew them very well. These character sketches and samples of the men's handwriting were submitted to 17 professional graphologists, 143 undergraduate students, and 25 faculty members. In each case the individual tried to match the ten handwriting samples with the ten character sketches. A perfect score obviously would have been 10, and by sheer accident one should get 1.4 correct. The median (or average) correct score for students was 2.1, for faculty it was 2.2, and for the graphologists 2.8. Thus, the professional graphologist was little better than laymen and not very much better than chance expectation.[7] There may be some diagnostic possibilities in recording such things as the pressure exerted on the pencil and other aspects of behavior while writing, but nothing appears in commercial graphology that would warrant taking it very seriously from the standpoint of guidance.

---

[4] Warner, L. and Clark, C. C., "A Survey of Psychological Opinion on E.S.P.," *Journal of Para Psychology,* 1938, 2, 296–301.

---

[5] Hull, C. L. and Montgomery, R. B., "An Experimental Investigation of Certain Alleged Relations between Character and Handwriting," *Psychological Review,* 1919, 26, 63-74.

[6] Omwake, K., "The Value of Photographs and Handwriting in Estimating Intelligence," *Public Personnel Studies,* 1925, 3, 2-15.

[7] Powers, E. in Allport, G. W. and Vernon, P. E., *Studies in Expressive Movement.* New York: Macmillan, 1933.

The Technique of Correlation Coefficients

In the foregoing section allusion was made to the correlation coefficient. This is a statistical technique that is very widely used in psychology. We now propose to take time out and familiarize the reader with this basic notion because we shall encounter it again and again in succeeding pages. The correlation coefficient is merely a statistical method for indicating the extent of the relation between two variables, or measurements, or judgments. In the present instance we were concerned with, among other things, the correspondence between estimates of intelligence from the handwriting and actual intelligence as measured by a test. If it developed that those who were judged to be most intelligent from the handwriting were also the most intelligent as measured by the test and *vice versa,* with this correspondence prevailing all the way down the line, we would speak of a large positive correlation. If, on the other hand, the person who was judged highest in intelligence actually was the lowest, and the person who was judged lowest actually was highest, and so forth, we would have a large negative correlation. If there was no tendency one way or the other, we would speak of a zero correlation or no correlation. By the use of a certain formula it is possible to compute a correlation coefficient (usually expressed as r), which indicates not merely whether the correlation is high, low, or negative, but exactly how close the relation between the variables is.[8] A coefficient of 1.00 indicates perfect correlation; that is, the person who is highest in one variable is correspondingly high in the other, the person who is next to the top in one is next to the top in the other, and so on down the line. A coefficient of -1.00 indicates a perfect negative correlation. Coefficients anywhere between these limits are possible with .00 indicating no relationship at all.

Interpretation of correlation coefficients of different magnitude is a bit involved. It is necessary to divorce one's self from any notion that these coefficients represent percentages and that a correlation of .50 is 50 per cent or half as good as the correlation of 1.00. This is far from the case. Adequate interpretation involves the theory of probability, but a hint may be given at this point. It is helpful to consider the problem from the standpoint of how well one variable could be predicted from the other. Perhaps it will be a little clearer to talk in terms of the example given in the Appendix 1, namely, interpreting the correlation between intelligence and school marks. After we know the correlation between the two variables, we write an equation that expresses one as a function of the other—that is, we express school grades as a function of the intelligence test score. Once we have this equation, we can put the intelligence test score of a new pupil in this equation and make a prediction as to how well he will do in school. If the two variables are highly correlated, this prediction can be made with considerable accuracy or validity, but there is always a certain amount of error involved. It is possible, however, to determine this error when we know the size of the correlation. It is also possible to determine the error that would be made in prediction if there was no correlation at all between intelligence and school grades, that is, if we merely guessed. We may then compute the percentage by which it is possible, using the intelligence test, to reduce the predicting error that would prevail if we had merely guessed at school performance or if the correlation was zero (note Example VI, Appendix 1). The forecasting efficiency for a few typical values of the correlation coefficient is given in Table 1. The correlation of .50, for example, reduces the error of prediction about 13 per cent from what it would have been if there were no correlation. A perfect correlation of 1.00 reduces the error 100 per cent.

---

[8] Appendix 1 illustrates computation of such correlation coefficients. In the example there, the correlation is computed between two variables that are very frequently correlated in educational psychology; namely, intelligence test grades and school marks. It will be noted that in the examples, the actual scores are given, and then are ranked in order and the formula applied to these ranks. Sometimes, one or both of the variables consist of ranks from the very start, as in the example discussed in the present chapter, where the judges merely ranked the handwriting specimens on the basis of presumed intelligence.

TABLE 1

Forecasting Efficiency of Various Degrees of Correlation.

Correlation Coefficient	*Forecasting Efficiency (per cent)*	*Correlation Coefficient*	*Forecasting Efficiency (per cent)*
.10	½	.70	29
.20	2	.80	40
.30	5	.90	56
.40	8	.95	69
.50	13	.98	80
.60	20	1.00	100

Phrenology

Greater plausibility. It is not many years since a number of industrial concerns had phrenologists working in the employment office. Phrenology goes a little further than the foregoing pseudo-sciences in that it actually looks at the client with a view to diagnosis or counseling. Moreover, it does have a little semblance of a scientific basis. Other scientists discovered that different parts of the brain had certain somewhat specialized functions such as vision, hearing, or movement. This gave the phrenologists a flying start. Why not a more detailed localization of cerebral function? Moreover, it was also demonstrated that the skull conforms to the underlying brain tissues to some extent, so it seemed plausible that if there was more development in some cerebral area, the skull would show a protuberance at that point. It was necessary, then, merely to observe the cranial protuberance and make a diagnosis. The phrenologists built up a system on the basis of casual observation of bumps which they felt with their fingers and correspondences that they noted in individual cases with particular mental characteristics. A book written in 1832 is still a standard text in phrenology.

Objections. Phrenology presupposes a very detailed localization of functions in different portions of the brain, whereas all scientific experiments point to the contrary. There are regions concerned with vision, hearing, and the like, but there is much vicarious function. If one part of the brain is damaged, another portion may take over its function. Incidentally, some of the alleged localizations of the phrenologist conflict with demonstrated fact. Love of children, for example, is located at the back part of the brain in the region that is actually concerned with visual sensation. Reverence is at the top of the skull near the region concerned with motions of the arms and legs. Benevolence is nearby. Hope is in the region that mediates sensations of touch and temperature.

Another erroneous assumption of phrenology is that of a direct relation between the development of a trait and the size of the corresponding region of the brain. There are slight relationships of this sort, for example, between brain size and intelligence, but the complexity of the structure is equally important. It is well established that speech is controlled by an area on the left side of the brain in right-handed people. Microscopic work indicates that the layer of gray matter in the corresponding region of the right side is not quite as thick, but the difference is less than a millimeter. No phrenologist could detect a difference of this magnitude by feeling the skull.

A third difficulty is that a few casual observations suffice for generalization. This, of course, flies in the face of all scientific method. We are tempted to note a few cases of coincidence and forget the negative instances. It is this same fallacy that lies at the basis of much of our superstition. We walk under a ladder ninety-nine times with impunity and the hundredth time a brick falls on our head, whereupon we generalize to the effect that walking under ladders is bad luck. This same fallacy was involved in deriving the original relationships between cranial bumps and personality.

Physiognomy

Popular beliefs. Physiognomy is the most prevalent of the diagnostic-guidance pseudo-sciences. Construed in the broad sense, it relates personality not merely to the face and head, but to the entire body and even posture or gait. Some popular physiognomic beliefs are caused by presumed similarity between humans and animals—for example, a bull-neck, a feline tread, or a clammy handshake. These generalizations are also fostered by expectation. If we believe that large ears denote parsimoniousness, we watch for instances of the trait and magnify them on the part of a large-eared person. With a slightly more rational approach we assume that some personality characteristics leave bodily traces. A studious person may become round-shouldered from bending over his books; a philosopher may contract his brows while pondering until the wrinkles become permanent; a criminal may repeatedly avoid the gaze of his prospective victims, and develop a shifty eye. Generalizations like this, however, often misfire because other factors might produce the same results. The round-shoulders might come from crap shooting, the wrinkled forehead from nearsightedness, and the shifty eye from operational fatigue. Thus, popular beliefs in physiognomy involve serious fallacies but do set the stage for those who would exploit physiognomy in a commercial way.

Commercial systems of physiognomy. Exploitation has led to seeming absurdities, although, as we shall see, the real answer is an empirical one. We learn, for instance, that "persons with fine hair and fine-textured skin love beauty and grace and should work with fine, delicate materials and tools. Blondes are changeable, variety-loving, optimistic, and speculative, whereas the brunettes are the opposite. Poets and educators have a triangular configuration of the head and body, wide at the top and tapering downward; generals, pioneers, engineers, explorers, and athletes are built along square lines; and judges, financiers, and organizers show a circular configuration." The writer once had his character analyzed by submitting to an analyst a coupon obtained when buying a pair of shoes together with a photograph and ten cents to cover mailing. The diagnosis based on his "structure" suggested that he should go in for artistic work, whereas his complexion pointed toward plumbing, carpentry, and blacksmithing as careers. The next page suggested he should be a brain worker.

The unfortunate fact, however, is that gullible individuals may take such advice seriously, and self-styled experts practicing absurd systems have been retained by industrial concerns. Sometimes, they have done fairly well when interviewing applicants, but it is difficult to tell how much was because of their system and how much was because of the ordinary judgment that any experienced interviewer may have. It developed in some such cases, that these experts were unable to transmit their methods to anyone else in the employment office.

Estimates of mental traits from photographs. When one evaluates the claims of physiognomists it will prove profitable first, to note the extent to which people in general are able to judge personality traits from physiognomy and second, to check empirically the claims of some commercial systems. A straightforward experimental approach is to obtain estimates of a group of people made by their intimate acquaintances, then submit photographs of those same people to judges who do not know them and have these judges attempt to estimate the same traits. In one such case a group of twenty-five men were ranked by other members of the group who knew them intimately with reference to such traits as neatness, conceit, sociability, humor, intelligence, and refinement. Then the photographs of these men were submitted to twenty-five other men who did not know them at all, and these latter attempted to estimate the traits in question from the photographs. In one method of analysis the average estimate of a trait, such as neatness, was computed using the judgment of all the twenty-five judges who looked at the photograph for each individual. These average judgments of the individuals from the photographs were then correlated with the average judgments of the individuals by their intimate acquaintances. For neatness this correlation was .03, for conceit, .10, and for ten traits the correlations averaged about .36.[9]

In most practical situations the results would be worse than this. It is seldom that we would have twenty-five judges to look at a person's physiognomy and pool their estimates. A more realistic analysis of the data would be to consider the effectiveness of individual judges. These results are presented in Table 2. For purposes of simplification ten judges only are selected and denoted by the letters *A, B, C,* and so forth, in the first column. The next columns give the correlation between a given judge's estimate and the characteristic as estimated by acquaintances. Judge *A,* for example, was not so bad with reference to intelligence (.51), but obviously quite incompetent in estimating neatness (.11). Judge *J* was fairly good in judging sociability, but much less successful in neatness or intelligence. All-round judges of character from physiognomy obviously are scarce.

---

[9] Hollingworth, H. L., *Judging Human Character,* page 37. New York: D. Appleton, 1922.

TABLE 2

Correlation Between Estimates of Traits from Photographs Made by Individual Judges and Average Estimates of Those Same Traits Made by Acquaintances.*

Judge	*Intelligence*	*Neatness*	*Sociability*
A	.51	.11	.39
B	.11	.10	.08
C	.15	.29	.05
D	−.27	.06	.49
E	.08	.24	.08
F	.43	.41	.28
G	.04	.11	.02
H	.39	−.09	.32
I	.22	−.08	.00
J	.30	.02	.55
Average	.20	.12	.23

* Hollingworth

In another study a group of managers, buyers, and assistants in a department store were given an intelligence test, and twelve graduate students attempted to estimate their intelligence from their photographs. One method of analyzing the data was to note simply the per cent that each judge placed on the correct side of the average—that is, whether a person who was actually above the average in intelligence was so judged from the photograph. Fifty per cent would be expected by sheer accident. The best judge achieved 64 per cent, and the worst one 45 per cent, with the average efficiency of the entire group of judges about 54 per cent.[10]

Another investigation was concerned with general vocational aptitude rather than with a specific trait. Photographs were available of university graduates who had majored in medicine, law, education, and engineering. Five were selected whom the alumni office considered very successful, and five who were considered very unsuccessful. Photographs of these persons taken at the time of graduation were submitted to a group of college students and also to a group of employment managers and experienced interviewers. In each instance the judge merely noted whether he thought the person looked as though he would be successful or unsuccessful. The personnel workers scored 52 per cent and the students 47 per cent where they should get 50 per cent by accident. Another set of photographs of the same people taken twenty-five years after graduation were likewise judged as to success, and the corresponding per cents were 53 and 51. Obviously, even persons with extensive experience in personnel work were unable to spot the successful people from their appearance.[11]

---

[10] Anderson, L. D., "Estimating Intelligence by Means of Printed Photographs," *Journal of Applied Psychology,* 1921, 5, 152–155.

In an experiment with reference to a specific vocational aptitude photographs of school teachers were ranked in order of success by a number of superintendents, secretaries of school boards, and secretaries of teacher-placement bureaus. These teachers were also ranked by six faculty members who went over the detailed records at the college where the teachers had received their training. The ratings by the faculty were then compared with those made by the officials on the basis of the photographs. There was complete disagreement. Correlations for different groups of judges averaged -.10, .14, -.01 and .37.[12]

One investigation will be mentioned in which gait was taken as the physiognomic variable. A group of college women were selected on the basis of "dominance" as revealed by one of the standard personality inventories. Eight were selected at each extreme of the scale, and the inventory was supplemented by personal interviews to corroborate the general trend. Motion pictures were then taken of these people walking. The films were shown to about 100 persons who attempted to judge whether the girl in the picture was dominant or the reverse. On the whole, dominance was judged only a little better than chance. Judgments based on the entire picture were slightly superior to those made when the upper or the lower part was obscured.[13] It should be noted further that quite irrelevant factors may influence judgments of this sort. Some individuals posed for photographs with and without glasses. Judges looking at the pictures rated the same individual higher in intelligence, dependability, industriousness, and honesty when glasses were worn. With two other traits the glasses made no difference.[14]

Experimental evaluation of commercial systems of physiognomy. Since we have noted the inability of people using their own system to judge personality from physiognomy, we may now consider the accuracy of some commercial systems. A typical investigation of that sort concerns alleged blonde and brunette traits. Blondes are supposed to be positive, dynamic, driving, and so forth, whereas brunettes are negative, static, and conservative. A list was compiled of twelve alleged blonde traits and fourteen brunette traits, and these were printed in random order on a blank. Ninety-four persons of above average intelligence were given these blanks. Each of them selected two pronounced blondes and two pronounced brunettes with whom he or she was well acquainted, and then checked in the list of twenty-six traits those which characterized these four acquaintances. In tabulating the results the traits were regrouped according to their alleged blonde or brunette character. The results appear in Table 3. The upper portion contains the alleged blonde

---

[11] Landis, C. and Phelps, L. W., "The Predictions from Photographs of Success and Vocational Aptitudes," *Journal of Experimental Psychology,* 1928, 11, 313–324.

[12] Johns, W. B. and Worcester, D. A., "The Value of the Photograph in the Selection of Teachers," *Journal of Applied Psychology,* 1930, 14, 54–62.

[13] Eisenberg, T. and Reichline, T. C., "Judgments of Dominant Feelings from Motion Pictures of Gait," *Journal of Social Psychology,* 1939, 10, 345–357.

[14] Thornton, G. R., "The Effect upon Judgments of Personality of Varying a Single Factor in a Photograph," *Journal of Social Psychology,* 1943, 18, 127–147.

TABLE 3

Percentage of Blondes and Brunettes Rated as Possessing Alleged Blonde or Brunette Traits *

Blonde Traits	*187 Blondes*	*187 Brunettes*
Positive	81%	84%
Dynamic	63	64
Driving	49	50
Aggressive	62	56
Domineering	36	36
Impatient	56	51
Active	88	82
Quick	70	68
Hopeful	85	85
Speculative	53	51
Changeable	53	43
Variety-loving	66	62
Average	63%	61%

Brunette Traits	*187 Blondes*	*187 Brunettes*
Negative	16%	17%
Static	28	31
Conservative	51	61
Imitative	39	40
Submissive	25	26
Cautious	54	60
Painstaking	56	61
Patient	43	52
Plodding	27	31
Slow	20	24
Deliberate	47	57
Serious	58	72
Thoughtful	67	70
Specializing	52	45
Average	42%	46%

* Paterson and Ludgate

traits and the lower portion the alleged brunette traits. The entries in the table are simply the per cent of the blonde or brunette group rated as possessing the traits indicated. For example, 81 per cent of the 187 blondes were considered to be positive—a blonde trait. On the other hand, 84 per cent of a similar number of brunettes were also rated as positive. The averages show that, on the whole, 63 per cent of the blondes manifest the supposed blonde traits, and so do 61 per cent of the brunettes, and 46 per cent of the brunettes possess the traits attributed to them, and 42 per cent of the blondes have these traits too.[15]

Another investigation included a larger number of physiognomic variables. Criteria were selected that actually could be measured in quantitative fashion, and traits were selected about which there was a fair agreement among the physiognomists. The traits involved were: judgment, intelligence, frankness, ability to make friends, will-power, leadership, originality, and impulsiveness. Thirty students were rated on these particular traits by members of their fraternities or sororities. These ratings were quite reliable in the sense that the different raters agreed closely about a given individual. Then these same students were subjected to measurements of the characteristics that were supposed to correlate with the mental traits. The measurements were made with calipers, sliding compass, steel tape, and headsquare. Whereas the character analysts merely look at the client, these experimenters used instruments that must have made their measurements, at the worst, far more accurate than the character analysts' observations at their best. The results may be summarized by averaging all the correlations between the physiognomic measurements for a given trait and the acquaintances' judgments of that trait. For example, twenty-nine different bodily characteristics were measured and each of these correlated with estimated intelligence. The average of these twenty-nine correlations as indicated in Table 4 is .03. Similar averages for the other traits appear in the table. The correlations are uniformly low. Thus the alleged physiognomic criteria of commercial systems do not stand the empirical test.[16] One experiment may be cited in which a practitioner was willing to participate in a scientific effort to demonstrate his facility. He called his system "vitosophy."[17] Twenty university students served as material, and he estimated on a five-point scale their ability in mathematics, written speech, science, general scholarship, intelligence, mechanical ability, and musical ability. College grades were available for the first four of these variables, intelligence was measured by a standard test, but self-estimates of mechanical and musical ability were used. The vitosopher's techniques involved some skull measurements, having the subject blow his breath against the examiner's hand in order to estimate "heat," and inspecting the hands and teeth. The correlations between the five objective measures and the estimates ranged from .32 for speech to -.21 for intelligence and averaged about .04. For the other two variables the correlations were actually in the wrong direction, -.55 and -.31, but less significance should be attached to them because the criterion itself was based on subjective estimates.

---

[15] Paterson, D. G. and Ludgate, K., "Blonde and Brunette Traits—a Quantitative Study," *Journal of Personnel Research*, 1922, 1, 122–127.

[16] Cleeton, G. U. and Knight, F. B., "Validity of Character Judgments Based on External Criteria," *Journal of Applied Psychology*, 1924, 8, 215–231.

[17] Ford, A., "A Check on Character Analysis," *Personnel Journal*, 1930, 9, 121–123.

TABLE 4

Correlation Between Ratings of Close Associates and Physiognomic Factors.*

Trait	*Correlation*
Judgment	-.01
Intelligence	.03
Frankness	.05
Friendliness	-.11
Will-power	-.07
Leadership	-.04
Originality	.09
Impulsiveness	.10

* Cleeton and Knight

Present status. It is difficult to secure statistics on the extent to which physiognomic methods are now being used in diagnosis and counseling. A few industrial concerns admit having tried things of this sort. Probably the principal commercial exploitation is in private practice. Metropolitan newspapers carry advertisements by self-styled applied psychologists who are available at a local hotel for counseling, and many of them rely on physiognomy. The mere fact that they continue to advertise indicates that there is some market for their gold bricks.

In the light of the foregoing experimental findings, it may seem surprising that the physiognomists are still in business. One reason is that they may accidentally hit one of many occupations for which the individual is fitted, and of course the system gets the credit. Then again, the analyst may, in the course of the conversation, discover certain likes or dislikes that may be of some vocational significance. Common sense suggestions on this basis might be accredited incorrectly to the physiognomy technique. If the client pays for the advice, he will try harder in the recommended vocation than he would have otherwise and thus, perhaps, succeed. Finally, when people are discussing experiences of this sort, they are likely to slip into the common fallacy of remembering the cases of coincidence, and forgetting the others. Scientific psychology does not always hit the mark in guidance and counseling, but does so more frequently than pseudo-psychology.

Schemes for Improving Memory

A second major field exploited by the pseudo-psychologists is the improvement of personal efficiency. This may take the form of memory training, increasing over-all efficiency and ability to concentrate and get things done, or modifications of personality. These will be discussed in order. Everyone on occasion forgets names, telephone numbers, or engagements. It is a simple matter to call the attention of prospects to these lapses, make them think that they are in a bad way, and then sell them the system of memory training.

Expert demonstrations and their futility. These schemes frequently are sold on the basis of a demonstration. The expert appears before a luncheon club, is introduced to a large number of persons, and subsequently reproduces their names; or he goes slowly through a deck of cards and then recalls them in order; or does some stunt with numbers, such as looking at a long series and then reproducing it correctly. The expert does these things without subterfuge, but the critical point is how to interpret the performance. He attributes it to his "system," but other things may account for the results. Some people have a naturally good memory for faces. A person with some training, without any particular system, can duplicate some feats of the expert.[18] In one instance the feat involved spending twenty minutes going through a deck of cards and then, blind-folded, naming the cards in order. Fifty students in a laboratory course practiced the same stunt. All of them reached the point where they actually could run through a shuffled deck for twenty minutes and then reproduce the order correctly. Two members were able to do this the first time with no training, the slowest student required only fifteen practice periods, and the average student required five to six. Thus, with a comparatively small amount of training, persons of ordinary intelligence using their own methods were able to duplicate the expert's demonstration, which suggests that there is nothing unique about his system. In one of the Midwestern states there is a man who can sit beside the railroad track when a sizable freight train is passing and look at the numbers on the cars, while another person records these numbers. Later, this man recites the numbers on most of the cars correctly. The interesting point is that this memory expert is feebleminded, but has an unusual facility for just one thing—recalling numbers. It is entirely possible that the alleged expert has a similar facility.

---

[18] Renshaw, S., "An Experiment on the Learning of Paired Associates," *Journal of Applied Psychology*, 1927, 11, 226–233.

Memory schemes using an arbitrary pattern. It is pertinent to examine critically a few commercial schemes for improving memory. One type depends on an arbitrary pattern with which the items to be memorized must be associated. For example, in order to remember effectively various combinations of numbers the following pattern is recommended:

1	2	3	4	5	6	7	8	9	0
E	B	A	T	I	H	F	M	U	C
R	S	D			P	L		O	

The first step is to memorize this pattern: then, to remember a sequence of numbers, one selects from the pattern the corresponding letters in order and from these letters makes some word or phrase which has a logical connection with the original item one is attempting to remember. If one wished to remember the university telephone number 3148, one would select from the diagram the four letters *A R T M.* These might suggest "art museum," which could be associated with the university—provided it had a museum. Subsequently, when one wished to recall the telephone number, university would suggest art museum, then *ARTM,* and then, by referring back to the diagram, 3148.

The following system has been proposed for remembering items in a particular sequence, such as recalling in order the Presidents of the United States. The basic feature is a standard list of common objects that are memorized in sequence and with which the objects in the desired series are to be associated. The key list might begin as follows:

1. alarm clock
2. razor
3. zippers on garments
4. dining table
5. chair
6. newspaper
7. automobile

Learning the list is facilitated by the fact that the words represent a sequence that one would follow when getting up in the morning at the alarm clock, shaving, zipping into garments, going to the dining table, sitting in a chair, and reading the newspaper. Suppose that someone wished to remember the Presidents of the United States in the order—Washington, Adams, Jefferson, Madison, Monroe—and he has already memorized the above key list. The next step is to associate Washington with an alarm clock, Adams with a razor, Jefferson with zippers, and so on. It might run something as follows: first there is a mental picture of a washing machine with an alarm clock sitting beside it, supposedly to give a signal when the washer had run for a sufficient time. This means "washing done," or "Washington." Adams might suggest "a dam"—a remark made when cutting one's self with a razor. Jefferson could be "jiffy on," by means of zippers. Madison is construed "maids on"—the job in serving breakfast. Monroe might suggest the French word *"mon"* and row, in other words, I get my chair from the row against the wall. Subsequently, when recalling the Presidents, one would merely think: alarm clock, washing done, Washington; razor, dam, Adams; zipper, jiffy on, Jefferson; dining table, maids on the job, Madison, and so forth.

Schemes like these tend to take the user the long way around. Considerable time is consumed in memorizing the standard pattern or key. Then, a good deal of effort is required to find meaningful associations in the sequences of letters or objects. The same amount of time spent in merely repeating the desired telephone number or repeating the names of the presidents in order would form the desired associations readily enough. The effectiveness of sheer rote memory has been demonstrated in many situations. These schemes sound interesting at first glance, but when a person attempts to form some of these freak associations, he soon discovers what he is up against.

Systems based on artificial associations. Some memory systems involve artificial associations without reference to any standard number pattern or list. This is an extension of the common tendency to employ little rubrics such as "Gold dollars are ever bright" or "Thirty days hath September," or determining if it is safe to eat oysters by noting whether there is a letter *R* in the month. Some specific schemes of this sort are satisfactory and are passed on to succeeding generations, but it is doubtful if one would find it profitable to spend much time concocting new rubrics as is sometimes recommended by the experts. The same amount of time would accomplish more if it was devoted to rote repetition. Moreover, these artificial associations may misfire. For example, in a large city successive downtown streets are named Spring, Long, and Gay Streets. Someone devised the rubric, "Spring Along Gaily" to facilitate remembering their order. This usually helped him but one day it came to him as "Spring Gaily Along." A history student who has trouble remembering dates concocted the following: "In fourteen hundred ninety-two Columbus sailed the ocean blue." However, he sometimes recalled it as: "In fourteen hundred ninety-three Columbus sailed the deep blue sea."

Other commercial systems put a premium on visualizing while forming these artificial associations. When learning a poem, one sometimes encounters difficulty in connecting each line with the following line. One system involves getting mental pictures or visual images of the last thing in one line and the first thing in the following line, and then blending them together into a single composite picture. For example, in:

Tell me not in mournful numbers,
Life is but an empty dream;
For the soul is dead that slumbers
And things are not what they seem.

The person constructs a composite picture of "numbers" and "Life"—perhaps a picture of *Life* magazine with a lot of numbers on the cover. When reciting the poem, as he reaches the word "numbers," he would see this picture of *Life* with the numbers on it and immediately get the word, "Life," for the second line. The composite of "dream" and "for" might be a picture of a person sleeping with four (for) conspicuous bed posts. Such a scheme works, of course, only for persons who are good visualizers; cluttering the poem with a lot of irrelevant visual imagery is confusing anyway.

Increasing General Efficiency

Inspirational techniques. The pseudo-psychologists claim to have methods of increasing a person's over-all efficiency. They advertise the "keys to success," or, for a consideration, will show how to release the powerful hidden forces within. Their books, pamphlets, and lectures assure the reader or listener that he is superior and that he can do anything he wants to if he just uses his will power. They even prescribe certain exercises similar to physical setting-up exercises. One widely marketed system consists of having the subject stand before an open window in the early morning, take a deep breath, and repeat "I can," while he focuses his attention on some specific thing that he desires to accomplish that day. Another system, which requires less exertion, provides phonograph records that give the listener a pep talk. The record player assures him that he is all right, is going to be still better, and will accomplish those things that he wants to accomplish.

Uncritical use of suggestion. The foregoing techniques rely heavily on suggestion or auto-suggestion. These mechanisms are sound enough scientifically in the hands of the competent psychologist and play an important role in psychotherapy. But the therapy is always preceded by diagnosis. By the same token, shortcomings in personal efficiency should be diagnosed before remedies are attempted. There is, of course, the chance that a therapeutic device may help, more or less by accident, just as aspirin taken uncritically sometimes helps a particular ailment. It is preferable, however, to consult a physician and ascertain the best medication. Similarly, if a person needs help regarding general effectiveness in his work, the first desideratum is expert diagnosis. It may be that the conditions under which a person is doing his work produce handicaps, or perhaps he needs to develop certain habits of work such as a place habit or time habit. Again, it may be a matter of working out a schedule of his activities. Some of these possibilities will be discussed in Chapter 7. They are not as dramatic as the claims of the pseudo-psychologists, but at least they are scientifically sound as far as they go.

Improving Personality

Oversimplification. There is no question about the importance of personality in business, domestic life, or social situations. The pseudo-psychologist goes farther and attributes practically everything to personality. The term is sufficiently high-sounding for commercial exploitation so we are told to get "instantaneous personal magnetism," or to "attain whatever you want by a stronger personality." The method recommended is reading a book, or buying a ticket to a series of lectures, or even going through some rigamarole in the way of talking to one's self in the mirror.

The difficulty with these approaches is that they oversimplify the problem. It is conceivable that some particular defect might be remedied by special attention or practice after expert diagnosis. However, those who are fostering this training do not limit themselves in any such fashion, but claim to improve the "entire personality." Moreover, the systems often conflict. One stresses dress, address, and charm; another keynotes unselfishness; still another emphasizes the smile; and some even imply that facial cream or lipstick have much to do with it.

Specificity of habit. Changes in personality lie in the field of habit formation. It is possible to break habits or to form new ones, once we know what is desired. It should be noted, however, that many of the habits involved in this connection are specific rather than general. If a person ties his necktie neatly, it does not necessarily imply that he will keep his desk orderly. Similarly, a person may exhibit tremendous persistence in his golf game, but manifest much less persistence in his daily work. The life of the party at the club may be a deadly grouch at home. A scientist may be utterly honest regarding his experimental data, but have no qualms if the streetcar operator doesn't take his fare. Thus, many of the habits that might be involved in the improvement of personality are specific rather than general, and training should concentrate upon the specifics.

No panacea. The need for specificity negates the main approach of the improvers of personality; they propound a general system to take care of every aspect. Some successful trends in the other direction may be cited. Many industrial concerns have a periodic rating of employees by their superiors with a view to detecting specific difficulties that may be remedied after they have been discussed with the individual. Other firms are so concerned about their public relations that they have a system of listening in when their employees are in contact with the public, either by means of a concealed microphone at the window to which the public comes, or by plugging in to the telephone lines over which the employees talk to the public. The employees know that this is being done and eventually have a conference in which their shortcomings, if any, are discussed constructively. If they are too hasty with the customer or too gruff in manner, it is simple to correct those particular habits once the difficulty is known. In the retail selling field, service shoppers posing as customers make purchases over the counter and analyze the techniques and personal characteristics of the sales person. Undue aggressiveness or impatience is detected and subsequently corrected. Here again, diagnosis is the first step.

It is even possible for an individual to scrutinize his own shortcomings. Some personality training schemes do make a crude attempt in this direction by providing a list of questions such as, "Are you afraid to meet people?" or "Do you feel that you are a success?" As a result of this self-scrutiny, the individual is supposed to locate his weak points and then apply some generalized panacea to them. Such analysis is more profitable in an interview with an expert. Otherwise there is danger of undue suggestion, as in the pseudo-medical advertisement about "Do you see spots before your eyes?" Thus, the improvement of personality in all its complexities necessitates expert analysis of the individual case prior to any particular treatment. The pseudo-psychologist puts forth a universal system of some sort which hits the real difficulty only by accident.

Psychological Cures

Field for scientific psychotherapy. The final attempted contribution of the pseudo-psychologist is therapy with which he proposes to cure mental ailments and sometimes even physical ones. People do have difficulties that are primarily mental in origin, and the psychologists and scientists in related fields have been a lot of help. If hysteria or an obsession is primarily mental in origin, it should yield to treatment by psychotherapeutic methods. There have been dramatic instances of persons under emotional stress who suddenly overcame an hysterical paralysis of speech or leg muscles. Similar cases have been treated successfully by suggestive therapeutics. Others respond to treatment that releases suppressed wishes or builds up an idea just the opposite of the obsession. An abnormally shy person may profit by deliberate practice in looking people in the face. Hypnosis sometimes is used with more extreme cases—such as a morphine habit. But the point is that the method of treatment which is efficacious depends upon the ailment, and initial scientific diagnosis is necessary.

Greater gullibility. Persons with mental difficulties are apt to be unduly susceptible to the blandishments of the pseudo-scientists. They are more suggestible and, in a way, are clutching at straws. In ordinary medical practice many patients become more suggestible as they enter a medical waiting room. This may actually be a good thing if the physician has occasion to use suggestion in his treatment. Frequently, it facilitates recovery for the person to think that he is going to recover. However, when the practitioner is a person with questionable ethics and no scientific techniques at his disposal, the increase in suggestibility is a cause for alarm.

Typical systems. The pseudo-therapist usually treats almost anything with his pet technique. These techniques vary from one practitioner to another. Sometimes it is a bit of auto-suggestion as in the famous slogan, "Every day in every way, I am getting better and better." Persons with all kinds of difficulties went around chanting this slogan. Another practitioner has a mental broadcasting station high up in the mountains on which he broadcasts treatment to subscribers who write or telegraph him and then tune in at the appropriate time. Another therapeutic procedure is "silent" treatment. Many marvelous cures have been reported by this method. "It will help the sick rise above disease and overcome despair. You will get the vibration of the campaign in the power of thousands of lives working for you and with you for your health and happiness." Evidently, this is some kind of cooperative venture, but it is under the leadership of one person. Some of these things take on the actual form of a cult, and a considerable number of persons engage in study and ritual centered around it. Unfortunately, it sometimes gets tangled up with religion.

Applied psychology clubs. Special mention should be made of groups that are deliberately organized by some practitioner. They are encouraged to meet periodically and to go through certain routines. They receive occasional inspirational literature, and perhaps a return engagement from the original organizer. One of the writer's colleagues inadvertently accepted a speaking engagement at such an organization, and the meeting he attended presumably was typical. It began with a hymn on Applied Psychology, sung by the group to the tune of "O, My Darling Clementine." The following are two verses and the chorus:

I am better, getting fitter,
And for health I do not pine.
Simply will and see it coming.
Applied Psychology is fine.

Concentration and fixation,
Pass the word along the line.
I can see myself look younger,
Every morning just at nine.

Ring the joy bells, ring the joy bells,
Ring the joy bells, don't repine.
I'm not lost or gone forever,
Applied Psychology is fine.

One of the members led the group in "concentration" with the lights dimmed. There was a discussion of "mind and spirit" and another hymn. The affair was ludicrous in one sense, but in another, tragic. Some of the members doubtless did have difficulties that needed expert attention and, although such meetings might bring temporary distraction, there would be little salutary carry-over to the real difficulties. The writer crossed the trail of this same club perhaps ten years after the event mentioned and found that it still was going, and that the members still met periodically. This instance is cited largely to indicate the hold that some of these pseudo-psychologists have on suggestible individuals. These practitioners are quite effective in capitalizing the credulity of persons who have, or think that they have, trouble.

Absence of diagnosis. The worst difficulty is that practitioners of pseudo-therapy proceed without any diagnosis. Almost anyone would consider it reprehensible for a physician to prescribe castor oil for toothache, asthma, tuberculosis, appendicitis, and fractures. It is equally absurd for a particular school of thought to recommend hymns about applied psychology or a pep talk on a phonograph record as a cure for headaches, poor attention, depression, lassitude, fear, unhappiness, obsessions, drug habits, or anything else remotely traceable to mental causes. There is no mental cure-all any more than there is a physical cure-all.

Treatment of physical ailments. Passing mention should be made of the fact that some of these persons purporting to provide treatment for mental ailments do not always draw a sharp line between the mental and the physical. If they get over into the distinctly medical field, their practice takes on a more criminal character. Some cults will attempt to treat almost anything. If, in the process of applying some of the techniques mentioned above, they overlook an organic ailment, the results may be catastrophic. Some agencies do not call themselves psychological, but nevertheless operate in much the fashion of those just described, perhaps under the guise of a religious name. They may even be sincere in their efforts, but this does not help the patient. The writer vividly remembers a boyhood companion who was allowed to die of diabetes while the representative of some cult was coming daily to sit with him and use whatever mental treatment was the stock-in-trade of the particular cult.

Over-all Check on Pseudo-Psychologists

In this chapter we have noted some of the efforts and shortcomings of the pseudo-psychologists in counseling, guidance, promoting personal efficiency, and therapy. The practical question arises as to how the layman can discriminate the sound from the unsound. One fairly good method is to examine the record of the person who is selling some psychological service, noting where he received his academic training, what kind of a degree he has, and whether he received the degree in psychology at a reputable institution. Moreover, the professional organization of psychologists, the American Psychological Association, has membership requirements that are apt to exclude the pseudo-psychologist. Almost any Psychology Department at a college or university would have a member who possesses a directory of the American Psychological Association. If the alleged psychologist is not a member of the Association, it would be sensible to inquire why, and the presumption would be great that this person is not adequately qualified. It is also a good policy for the layman who has a psychological problem to contact the nearest university with a Psychology Department, and ask them to refer him to someone capable of dealing with his problem. In addition to individual consultants, there are a few commercial organizations of psychologists that render similar service. The way to check on the organization is to scrutinize its individual members as to their psychological competence.

As has been indicated, pseudo-psychology has been an appreciable handicap to the advancement of the real science, and, worse than that, it has done a lot of individual harm to persons who have unwittingly employed persons with inadequate psychological competence to help them on personal problems.

Summary

Many persons without psychological training are selling their services in the fields of guidance, improvement of personal efficiency, and therapy under the guise of psychology. It is well to note some of their shortcomings before discussing the positive contributions of applied psychology. Astrology has never been evaluated statistically. Guidance by persons in the spirit world contacted through some medium is futile, certainly until telepathy has been demonstrated experimentally. Graphology does not hold up under experimental investigation when alleged characteristics of handwriting are correlated mathematically with the traits they are supposed to reveal. Phrenology has a semblance of a scientific basis, but the brain is not functionally divided so distinctly as to validate phrenology's assumptions. The differences in size due to differences in function are too minute to be detected, and the system has been built up on the basis of casual observation with neglect of negative instances. Popular belief in physiognomy paved the way for its commercial exploitation. However, experiments indicate that people can estimate mental traits from photographs with very little reliability. When commercial systems of character analysis are evaluated experimentally, the correlations between physiognomy and the characteristics it is supposed to predict are almost nil.

Systems for improving memory are sold usually on the basis of a demonstration that might as well be due to natural facility for remembering the materials in question as to the alleged system. Some memory schemes involve an arbitrary pattern with which the items to be remembered must be associated, and sometimes artificial associations are built up in specific situations. In either instance the system takes a person the long way around and the same amount of time spent in going over the material in rote fashion would accomplish much more. Other general systems are available for increasing over-all efficiency. They rely on inspiration and an uncritical use of suggestion and are not preceded by adequate diagnosis of the real difficulty. The training of personality is much oversimplified. The assumption is made that habits are general, whereas many of them are specific. Some panacea is proposed, but the personality difficulty should be analyzed at the outset, and then the appropriate procedure can be followed.

Psychology contributes substantially to psychotherapy but the pseudopsychologist treats anything by his single pet technique. This may involve auto-suggestion or may actually get over into the occult. Practitioners have even organized applied psychology clubs which meet regularly and go through various rituals. The most insidious harm is caused by the absence of any diagnosis prior to the treatment. If persons are in doubt about the qualifications of an alleged applied psychologist, it is good practice to investigate the psychologist's background and the type of training that he has received to qualify him for this kind of work.

4

EDUCATIONAL SIGNIFICANCE OF DIFFERENCES IN INTELLIGENCE

THE MAJOR FIELDS of applied psychology could be discussed in almost any order, but we shall begin with some of the contributions to education, one of the first fields in which psychology was utilized. For another thing, education is the biggest single enterprise in which applied psychology operates. There are something like 30,000,000 school children in the educational system, and upwards of 1,000,000 teachers with an annual personnel budget of perhaps $3,000,000,000. Moreover, the social consequences are still more impressive, although they cannot be stated quantitatively. Heredity, to be sure, is of tremendous importance, and we are ever so limited by ancestral germ plasm. It is impossible to teach an idiot to read a newspaper or make a musician out of a person who cannot discriminate one note from another. Vocational maladjustment very frequently stems from these hereditary limitations. But when the inborn factors are somewhat equal, education does make the difference between a chain store clerk and an engineer, a kidnapper and a clergyman, a painter and a theoretical physicist, or a radical and a conservative. It may adjust the individual to his environment so that he will be efficient and happy, or it may fail in this high purpose and produce vagrants, criminals, psychopaths, and suicides.

We shall be discussing education primarily from the school standpoint because that is where it is formalized and most under control. However, it should be remembered that education extends beyond the school years in both directions. From infancy right through to senility, man is being modified by the things about him and the people with whom he comes into contact. Educational problems must be considered not merely in the school context but also in the home, the playground, the moving picture theater, the factory, and the office. The next two chapters will deal essentially with the raw material of education, the human individual and that part of his development that takes place during the educational process. Just as the manufacturer fabricates from raw materials, so the educational system and the individual teacher work with youngsters. The correct answer of a prospective teacher to the question, "What are you going to teach?" is not "history" or "mathematics" but rather "children."[1]

Physical Capacity and Growth

Growth. At the outset we shall make brief mention of the physical organism because its functional adequacy has much to do with the planning and operating of an educational program, and bodily conditions often have psychological consequences. Although the teacher is primarily concerned with the pupil as a stimulus-response mechanism, the mere process of physical growth influences the individual. Certain aspects are obvious such as the necessary skeletal development before one can walk, minimum strength required for handling certain tools, and physical size as related to participation in athletics; but there are more subtle aspects. Growth is in itself an experience to the individual, and often a bewildering experience. The adolescent boy who suddenly becomes tall with large unwieldy feet and a fortuitous crack in his voice is bound to be confused. A child may be painfully aware of his physical inferiority to an adult or to some older child in the family, which inferiority feeling may even lead to a dream world in which he imagines himself superior to this other person. Then there are the physical changes incident to adolescence. Girls mature more rapidly than boys until the late 'teens. The teacher in a mixed school must realize that some of the sixteen-year-old girls are practically women physically and emotionally, whereas some of the other sex are still little boys.

Health. Aside from normal physical changes with growth, the teacher should also be alert to health problems as they influence educational progress. Health statistics on the school population are disquieting, but the larger school systems at least are making efforts to survey their health problems and correct handicaps. Many a nearsighted child has been regarded as dumb, simply because he could not see the blackboard and missed important parts of the lesson. Another child may work as rapidly as possible in order to have time to rest from eye-strain, and thus do careless work. Similarly, defective hearing produces obvious handicaps; and many organic ailments such as adenoids or tuberculosis, although not as obvious, do render the organism less efficient. The point is that these difficulties should be somebody's problem. The teacher is not a medical person, but can at least be alert to health problems. Many times she will be the first one in a position to note that something is wrong, as when a child becomes irritable or lethargic. She should take steps to bring the problem to the attention of a qualified person. Even when a child is showing some pronounced psychological aberration, it is always wise to check first to find out whether there is an organic condition that might be aggravating the psychological difficulty. This is routine procedure for psychological clinics.

---

[1] More detailed discussion of many of these problems and of other educational psychology problems may be found in Pressey, S. L. and Robinson, F. P., *Psychology and the New Education.* New York: Harper's, 1944.

Intelligence and Its Significance in School Problems

The school is concerned with the pupil's mental stature as well as his physical stature. The psychological approach to this variable is the so-called intelligence test. The first breakdown of different types of psychological tests is twofold—aptitude or capacity tests on the one hand, and proficiency or achievement tests on the other. The aptitude tests deal primarily with potentialities and attempt to predict the individual's future performance. A person may never have studied chemistry, or kept books, or operated a hand feed dial machine, but the test indicates that he has the potentialities which, given opportunity, will make him a good chemist, bookkeeper, or dial machine operator. The proficiency or achievement test, on the other hand, indicates what the person can do right now in some particular function such as solving quadratic equations, taking shorthand, or driving a car. The aptitude test takes a long look into the future. The proficiency test looks to this afternoon.

Aptitude tests are subdivided further into general and special. The former is usually called an intelligence test. A person who makes a good score in such a test is alert enough to catch on quickly in a wide range of situations. He will do well in school or office work, or, in general, will achieve success in a professional or business career. Such a test is apt to have some predictive value in a wide range of situations. A special aptitude test, as the name implies, indicates potentiality for more specific functions. The applicant is quick enough to keep up with an assembly line after he has had a chance to learn the job, or he is sufficiently well coordinated to operate a punch press, or the prospective entrant to the conservatory has sufficient discrimination of pitch and time intervals so that he has the potentialities of a successful musician.

In all such cases too much emphasis cannot be given to the fact that the psychologist does not pull aptitude tests out of a hat and start using them for some practical purpose. He first determines what is to be predicted and then gets access to subjects whose efficiency in that "criterion"—school performance or efficiency in an industrial job—is known. After he gives them a test, he compares test scores with efficiency in the job—the criterion. If a high correlation is obtained, he knows that the aptitude test has validity and that it is safe to use as a basis for prediction. Not until this step has been taken is the test really an aptitude test in the sense that it does predict potentialities of a given sort.

Confusion sometimes arises from the fact that the same test may measure either aptitude or achievement. A vocabulary test may indirectly reflect intelligence because the more alert individual has kept his ears open and picked up a larger vocabulary. The test also indicates his command of English at that moment, that is, his achievement. If, however, we think of the test in terms of its validity, the confusion largely disappears. If the test correlates adequately with a criterion, we can then use the test to predict that criterion.

Another source of confusion is the comparative role of heredity and environment. The usual aptitude test puts more of a premium on innate factors. People are born with high intelligence, quick reaction time, or good manual dexterity rather than with ability in shorthand or geography. But there are exceptions: brain injury, on occasion, will affect intelligence test scores. Very limited cultural opportunity will too, because most current intelligence tests presuppose that the subject has been exposed to certain things in our culture. On the other hand, the ceiling score in an achievement test may be determined somewhat by innate capacity. If a person has more to start with, he will go further with a given amount of training. Heredity and environment are so interwoven that it is almost impossible to disentangle them, and it is not profitable to spend much time attempting to do so. After all, this innate-acquired aspect is not basic to the use of the test for predictive purposes. We are not so much concerned with *why* he scores thus in the test but rather with the information the score gives us about an aspect of behavior that we wish to predict in the academic or vocational field.

Intelligence tests fit under the general aptitude classification mentioned above. Their practical use in school or elsewhere does not stand or fall with the term intelligence. In Chapter 2 (page 31) it was pointed out that the notion of intelligence held by different scientists depends considerably upon the interest with which they approach the problem.[2] We talk glibly enough about intelligence tests, but regardless of the basic concept of intelligence and the terminology, the most important thing is the validity of the test. We give such tests to children and on the basis of the tests, we are able to predict the children's school adjustment or their suitability for a clerical job. The test would be just as useful in a practical situation if it were called an "XYZ Test." Validity is the all-important consideration.

---

[2] For a summary of definitions of intelligence see Goddard, H. H., "What is Intelligence," *Journal of Social Psychology,* 1946, 24, 51–69.

Measurement of Intelligence

Binet test. The first efforts to measure intelligence were made by Binet near the turn of the century. He noted the varying success of children in school and thought that it might be due to a psychological factor. He set out to develop tests to measure those aspects of the individual that contributed so essentially to school success. His approach was by way of developing a series of questions or simple tasks that the average four-year-old could answer, another set for the five-year-old, and so forth. The questions were to appear something like a game or a chat with the examiner, and the items involved were based on minimal essentials to which every school child presumably had been exposed, or were things that the child should be able to pick up from everyday experience. With equal opportunity, the brighter youngsters should pick up more information and have greater facility in simple problems. Binet's questions were translated, modified, and re-standardized by Goddard, and others, and finally by Terman, whose revision has been most widely used. The basic notion[3] in the Binet approach is that of mental age as contrasted with chronological age. If a child, for example, passes the items designed for five-year-old children, but fails on the six-year-old questions, he is given a mental age of five regardless of the fact that chronologically he may be seven or eight. It is possible to fail questions at one age and compensate by passing some questions at a higher age. Each question counts so many months; if there are six of them at a given age, each counts two months. The average six-year-old child should have a mental age of six in the test and so on for all other ages. It is possible to secure a mental age anywhere from two years to twenty-two years and ten months on the test. The reason for including no higher mental ages will be apparent in a moment.

A few items from the Binet test may be mentioned by way of illustration. The two-year-old level includes the following:

1. A toy cat is placed under one of three boxes, a screen is held in front of the boxes for three seconds, and then the child is required to "find the kitty."

---

[3] Terman, L. M. and Merrill, M. A., *Measuring Intelligence.* Boston: Houghton Mifflin, 1937.

2. Several objects must be identified as they are presented on a card. For example, "Show me the ball," "Show me the scissors."
3. The child is asked to point to the eyes, the feet, and the nose on a paper doll.
4. Circular, square, and triangular blocks are removed from a simple form board while the child is watching. He is required to put them back in the correct holes.

Some of the items at the nine-year-old level are as follows:

1. Look at a card with a rather complicated diagram for ten seconds and reproduce it from memory.
2. Rearrange groups of words to make a sentence, for example, "A have dog I found," "Wool the was coat of made."
3. Recognize absurdities by noting what is foolish in sentences, for example, "A father wrote to his son, 'I enclose ten dollars. If you do not receive this letter, please send me a telegram,' " or "A soldier complained that everyone else was out of step except himself."
4. State similarities and differences between certain items such as honey and glue, pencil and pen, banana and lemon.
5. Give rhymes for such words as date or head as rapidly as possible for thirty seconds.

At the average adult level we find items such as the following:

1. Give the meaning of an abstract word like generosity, attendance, empty, authority.
2. Suggest a solution for problems such as the following: How can one go to the river and bring back exactly two pints of water when one has only one five pint and one three pint container.
3. Complete analogies like the following: "A rabbit is timid, a lion is ________." "Trees are terrestrial, stars are ________."
4. Discover the system in a simple code and apply it in writing another word.
5. Interpret proverbs such as "We only know the importance of water when the well is dry."
6. Show orientation in problems like the following: "Suppose you were going south, and you turned left and then right, what direction are you going now?"

Questions like the above are administered to the child individually by a trained examiner. It is often assumed erroneously that anyone can give the Binet test simply by getting a book and reading the questions. It is more subtle than this. In an individual test of this sort some little variation in procedure may make a considerable difference in the results. The technique is not foolproof. The inexperienced examiner may be inclined to help the child along a little or to amplify some question, whereas the whole test is based on an absolutely standardized procedure of administration. To cite one instance of this, there is an item in which the child is shown a picture of a circle with a small section of the circumference removed. It is explained that this picture represents a field and that a ball is lost in the field. The child is to take his pencil and trace the path that he would follow, starting at the gate, in searching for the ball. The purpose of the test is to determine whether the child shows any system such as going in a spiral or systematically back and forth. This item is predicated on an administration without any hint as to procedure. However, an untrained examiner is tempted to say, "Take the pencil and show me how you would go *round* to find the ball." The use of the word "round" gives the whole thing away by suggesting a spiral pathway, whereas what was wanted was to see if the child would hit upon a systematic method himself.

Another aspect of tests like the Binet test should be mentioned at this point; an experienced examiner will get more from the test than the mere mental age. The test affords an opportunity for a clinically trained examiner to observe a lot of other symptoms and characteristics, much as would be done in a clinical interview. He might note, for example, nervousness during the taking of the test, tremor of the hands, hesitation on certain key words that might indicate some mental suppression, and general emotional instability. In many clinical situations we rely heavily upon an interview with a skilled clinician. During the administration of an individual intelligence test like the Binet, it is often possible to achieve much the same result.

Intelligence Quotient. The Binet test yields a mental age by simply totaling the credit for the items that have been passed successfully. The Intelligence Quotient, or I.Q., is the mental age divided by the chronological age, usually taking both of them in months. If, for example, the mental age is twelve years and the chronological age is ten, the I.Q. is 120,[4] that is, the child is twenty per cent above the average mentally for persons of his chronological age. If his mental age is ten years and three months and his chronological twelve years and nine months, his I.Q. is about 80 (123 months divided by 153 months), that is, his intelligence is eighty per cent of that of the average youngster of age twelve years nine months.

The above procedure breaks down in dealing with adults because the capacity measured by the Binet test stops developing somewhere in the middle 'teens. Thereafter, a person's intelligence does not increase; he merely acquires more information or education. A normal adult at the age of forty-eight who secured a mental age of sixteen on the test would be doing well. If his I.Q. were computed directly, however, it would be 33 which would indicate a low-grade imbecile. The standard procedure, then, is to consider the chronological age sixteen when computing the I.Q. of anyone who is older than that chronologically. The assumption is that the mental age of sixteen is typical for the average adult. There is doubt about the exactitude of this figure. Some authorities are inclined to put it a little lower than sixteen. There are also some minor adjustments in computation to take account of the fact that the rate of growth of intelligence is decreasing in the 'teens. These corrections can be obtained from a formula or from tables which are provided with the Binet manual.

---

[4] It is conventional practice to carry the ratio to two decimal places and drop the decimal.

As a matter of fact, it is not very good practice to use the intelligence quotient concept with reference to adult intelligence except for the mental defective or borderline case. Tests like the Binet which yield a mental age and thus an I.Q. have been designed primarily for children and not for the above-average adult. The intelligence quotient is a convenient way of expressing the manner in which the child's intelligence has developed up to the time of the test. With adults the I.Q. is apt to be misleading in the type of problem concerned with intelligence. There, it is better to interpret the test scores in terms of their distribution in the population under investigation, such as college seniors or executives in a given industry. For a concise index, the percentile score (page 73) is useful and widely employed.

An unfortunate error in everyday terminology should be noted in this connection. The term I.Q. is frequently used as synonymous with intelligence. Laymen discuss "I.Q. Tests" when they mean any type of intelligence test. The term I.Q. should be reserved specifically for the ratio of mental to chronological age.

Group tests. Individual tests like the Binet are time-consuming. If we wish an over-all survey of the general intellectual level of a particular schoolroom or a similar check on a group of office employees, it is desirable to have some more expeditious procedure. The solution is group tests, which a considerable number of people can take simultaneously by means of printed blanks. In a common form each question is followed by several alternative answers from which the subject selects what he considers to be the appropriate one. A simple example would be:

Christmas comes in: January, October, December, June.

The subject merely checks December if he considers that the correct answer. The usual group intelligence test involves a considerable variety of items—giving the opposites of a series of words, simple arithmetic questions, analogies such as "Arm is to elbow as leg is to ________," completing number series, such as "two, four, six, eight, ————, ————," and sometimes items of general information to see if the subject has been sufficiently alert to pick up information to which everyone has been exposed. A few typical items from such a test at approximately the high-school level are as follows:

1. The opposite of success is—happiness; failure; honor; depression; joy.
2. In what war was Gettysburg famous? First World War; 1812; Spanish-American; Civil; Mexican.
3. If you go camping and pay one dollar, which was one fourth of the total expense, what was the total cost of the trip? $2, $3, $5, $3.50, $4.
4. Why are airplanes used for mail service? They are safe; they cannot be robbed; they are not stopped by storms; they are cheaper than trains; they are very fast.

A considerable number of group intelligence tests are available, ranging from the earliest grades at which the subjects are able to read the material and execute the directions, up to very exacting tests at the university level. Nowadays few persons get through the educational system without having encountered intelligence tests.

The usual group test is more foolproof than the individual type. In many cases the examiner merely has to start and stop the subject on time. Moreover, the scoring is objective, requiring no interpretation on the part of the examiner, and is purely a clerical job. This stems from the fact that there is only one of the alternative answers which is correct, and the subject either gets or does not get that correct one. If the alternatives were not provided and the subject merely gave what he considered to be a good answer, there might be some responses whose correctness was debatable. This form of test also facilitates quick scoring. If the answers are all on a printed sheet, the correct ones are in exactly the same topographical position. A transparent stencil correctly marked may be laid over the blank, and it is very simple to note whether the subject's marks correspond to those indicated on the stencil. This procedure can be simplified further by having at the right end of the line four little boxes numbered one, two, three, four. The subject puts a check mark in one of these boxes, and the boxes may be scored with less ocular fatigue than the scrutiny of the whole paper would involve. Sometimes the answers for a long test are made on a single sheet that can be slipped sidewise for each new page of the test, thus starting a new column of boxes. It is possible in this way to get several hundred answers on an 8½ by 11 inch sheet. Such a test may be pre-scored, as it were. In a modification devised by Toops the subject responds by punching through the appropriate box with a needle on a small handle. Later, the backing is removed from the answer sheet, and the places where the holes should appear have been printed on the back of the sheet. The scorer merely has to count holes through black squares. The latest development in scoring utilizes electrical equipment. The subject makes marks on a special answer pad with an electrographic pencil, which has a special lead. The answer sheets are then fed through a machine in which little brushes press on each place where an answer might appear. The machine has been wired previously so that the brushes for the places where the correct answer should appear are hot. As the sheet goes through the machine, the marks made by the subject complete circuits through the appropriate brushes and the resulting electrical currents are integrated on a milliammeter that has been calibrated in terms of number of correct responses. Thus, it is possible for an operator to place a blank in the machine and instantly read the number of correct responses.

Group tests do not yield an I.Q. directly but a raw score of number of items correct. It is possible to transmute these into approximate I.Q. scores by giving a Binet test and the group test in question to the same individuals and thus determining equivalences. This procedure is much more satisfactory with children than with adults. A common practice with group tests is deriving percentile scores, which establishes scores in terms of a particular group of people who took the test. We simply compute the per cent of the group equaled or exceeded by those who make a designated raw score. A 75 percentile score means that a subject making the corresponding raw score equals or exceeds 75 per cent of the group. A 50 percentile obviously is right in the middle or average.

For young children or illiterate adults, such as the army examiners found in distressingly large numbers, we have to rely on a different type of group test. A typical one consists of a page showing some thirty pictures in each one of which some part is wrong—an envelope, for example, has the postage stamp on the wrong corner—and the subject is supposed to cross out the wrong part. Another test involves a group of pictures, one of which does not belong with the others: there might be four birds and one animal. The subject should check the animal. A more difficult test involves pictures of piles of cubical blocks with some of the blocks missing so that the top of the pile is irregular. The subject must indicate the number of blocks in the pile.

Performance tests. Other tests that avoid the literacy handicap require individual administration. Form boards which have holes of certain shapes and blocks that fit into those holes are typical. In the simpler forms there is a single block, a star, a cross, or a square, which fills each hole; in other instances several blocks have to be put together to fill the hole, more after the fashion of mechanical puzzles. Other tests resemble picture puzzles. The picture completion test consists of a large detailed picture at various points of which small half-inch square areas have been removed. The subject is provided with a lot of half-inch squares containing a wide variety of pictures and is asked to select the appropriate ones to fill the holes in the large picture. One picture shows a ladder extending into an apple tree, a boy half-way up the ladder with his hand extended, a basket on the ground below, and a vacant square part-way between his hand and the basket. It is obvious to a bright person that the picture of an apple should be supplied at this point. If the subject selects a shoe, he obviously failed to see the relationship.

Mechanical intelligence. The term intelligence usually connotes that type of intelligence which we have been discussing and which may be termed "abstract" or "verbal." A general aptitude for dealing with things and an aptitude for dealing with people, called respectively mechanical intelligence and social intelligence, exist also. The former does not mean mere dexterity, but that more general characteristic which gives a person an advantage in almost any situation where he is dealing with concrete objects. One widely used test of this aptitude involves assembling a number of small appliances. A box is divided into compartments, in each of which are placed parts of some simple object: a small monkey wrench, a small chain, a spring paper clip, a bicycle bell, a coin holder, a spring clothes pin, a shut-off for rubber hose. Some mechanical insight is required in assembling these objects, and the subject is scored according to the time required. A mechanical intelligence test for group administration has a printed blank with pictures of mechanical objects, each test item including two groups of objects. One group might comprise a screwdriver, tire pump, brace, and hammer, and the second group an anvil, wood screw, tire, and bit. The subject matches these objects indicating that the screwdriver goes with the wood screw, and the hammer with the anvil, and so on.

Social intelligence. Only a few social intelligence tests have been devised. In one type of item the subject must recognize a social situation sufficiently to detect the wrong word in each group as quickly as possible.

1. Orchestra, overalls, favors, chaperon, program
2. Cheerleader, gown, address, diploma, degree
3. Bride, clergyman, soup, organ, ring
4. Judge, colonel, jury, plaintiff, defendant

In another subtest the subject indicates in which situation the remark would be appropriate.

1. "Your lead, partner."—bridge game, tennis, dance, prize fight.
2. "Baby needs a pair of shoes."—mother to child, gold-digging chorus girl, game of dice, toe-dancer.
3. "Forty love."—man talking to wife, tennis match, Broadway musical review, stock market.

Again, the subject identifies the emotion in items such as the following:

1. "Oh, what's the use?"—despair, anger, grief, pain.
2. "*Must* you do that?"—surprise, annoyance, impatience, forbearance.
3. "Attaboy!"—discredit, praise, surprise, command.

In the following examples the subject checks what he considers the best alternative action.

1. You accidentally break a small vase which belongs to your hostess—cry; say that you'll replace it; get a dust-pan and clean up the mess; say "I'm glad, because I didn't like it anyway."
2. You are dancing and step on your partner's foot—stop dancing; apologize; laugh; run away.

Another kind of item deals with everyday information that might be used in small talk.

1. A Grand Slam is taking—six tricks; no tricks; thirteen tricks; nine tricks.
2. The number of beats in a measure for waltz music is—six; two; three; four.
3. A mallet is used in—tennis; bridge; croquet; hockey.

Distribution of Intelligence

Normal frequency curve. We may plot a distribution curve of intelligence by putting the intelligence scores on the horizontal axis, and at each point erecting a perpendicular proportional to the frequency of individuals making some particular score. Connecting the tops of those perpendiculars yields a typical distribution curve like that shown in Figure 1 (page 34). The high frequency near the middle of the intelligence range and the decreasing frequencies toward the extremes are very characteristic. If the curve is in terms of I.Q.'s, the high point for a random sample comes at approximately I.Q. 100. Thus, intelligence test scores follow the same trend as so many other psychological and physiological measurements.

Feeble-mindedness. At the upper end of the distribution curve is genius and at the lower end, feeble-mindedness or mental defect. The educational implications of these extremes will be discussed later. It is customary to consider the feeble-minded as persons with I.Q.'s below

70, but the line cannot be drawn too sharply. It is advisable to consider also what is termed social competence. Some people with borderline intelligence manage to get along, earn a modest livelihood, keep out of jail, and even raise a family. Others at the same intellectual level, however, get into trouble and are unable to take care of themselves, let alone a family, from an economic standpoint. Demonstrated social incompetence plus an I.Q. below 70 yields a fairly clear diagnosis.

The feeble-minded may be further subdivided. At the bottom of the scale is the idiot with an intelligence quotient of 25 or less. He cannot preserve his own life and must be cared for like an infant. The imbecile scores roughly between 25 and 50 I.Q. He may be able to get around as well as any adult and do simple manual work; and he can avoid ordinary danger, feed himself, and do other easy things. He is, however, completely handicapped when it comes to making a living. In institutions he is usually given some such task as transporting rocks in a wheelbarrow merely to keep him out of mischief. The moron, with an I.Q. between 50 and 70, may appear normal to the casual observer. However, he lacks foresight and cannot get along very well in the social scheme of things; he can work successfully only under supervision and cannot go very far on his own. The idiot and the imbecile are likely to be identified because they are so obviously incompetent. The moron may get by and in his school career merely appear dull unless the school is equipped with effective diagnostic methods.

The dull or borderline child as well as the moron poses educational problems. If intelligence distribution curves are plotted for random samples of pupils at different school levels, a trend is noted, when progressing toward the more advanced grades, for the distribution curve to be more and more skewed toward the high end: the higher grades comprise pupils of higher average intelligence. This reflects the selective effect of schooling; in a way, school is a prolonged intelligence test. Those at the low end of the distribution gradually are eliminated by failure or voluntary withdrawal.

Growth of Intelligence

Increase in absolute units. The individual grows in intelligence just as in physical stature and the rate of this growth is of interest. The general trend is shown in Figure 2. Chronological age is indicated on the horizontal axis, and mental age on the vertical. Curves are presented for several different samples, some from England and some from this country. Each sample presents results for the average member of the group indicated. All the curves show the tendency to rise at a fairly steady rate until the early 'teens when they begin to level off. It will be recalled that the average adult has a mental age somewhere around sixteen. It is of further interest to note the effect of growth on the initial differences in intelligence. The curves in Figure 2 show quite clearly that, regardless of school and social experiences, the intellectual differences between the groups were not lessened but were accentuated. Those who ultimately won scholarships were about four years mental age ahead of the defective group at chronological age six. By the time both groups had reached the chronological age of eighteen, the scholars were about twelve years ahead mentally. The curves also indicate that the brighter individuals do not begin to level off at quite such an early age. The curves for the imbeciles and idiots show such meager changes due to growth, as to have no constructive educational implications. After the curve for intellectual growth levels off, it drops very slowly through life and with a somewhat increasing rate until the onset of senility. Individual differences at this end of the curve are about as marked as those indicated at the initial end in Figure 2.

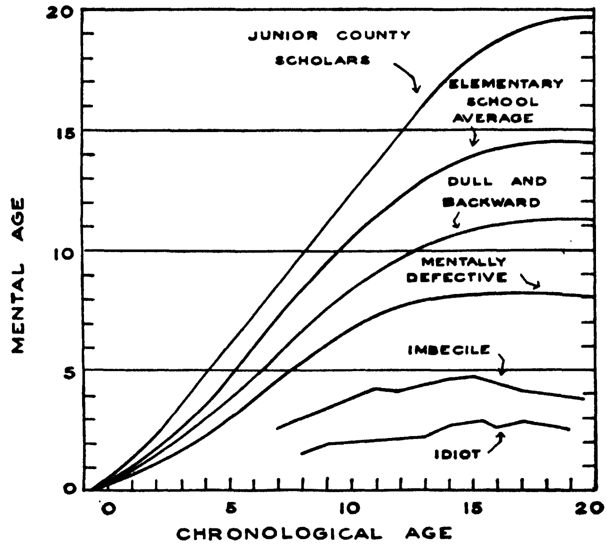


Figure 2. Growth of Intelligence.

Constancy of the I.Q. The tendency toward stability of intelligence test performance shown in Figure 2 is sometimes formulated as the constancy of the I.Q. This formulation has been none too profitable and has led to bitter controversy somewhat out of proportion to the importance of the problem. Re-tests with intelligence tests do show some inevitable fluctuation. It is all a question of their magnitude. There are, naturally, chance factors present when a person takes an intelligence test, or any other kind of test, for that matter—factors like fatigue, time of day, worry, illness, distraction. In a re-test there may be a slight carry-over of practice from the first experience. It has been found that with young children different individuals administering the same Binet test to the same child get I.Q.'s that differ by a few points. With re-tests of intelligence over a period of years, various investigators report changes in I.Q. amounting to five to ten points. In some instances these changes are no greater when the environment has been deliberately altered—transferring the children from an orphanage to a good foster home. Many of the differences under those conditions are not much greater than when only random factors have been allowed to operate between tests. For every investigation showing marked changes, it is possible to find a similar investigation in which such changes did not occur.

Looking at the problem from the standpoint of correlation between tests and re-tests, coefficients from .80 to .90 are frequently reported. The correlations seem to be lower when the initial test is given to the child at pre-school level, which suggests the inadvisability of making long-time predictions on the basis of intelligence tests given to very young children. But barring the occasional instance where thyroid treatment has produced marked intellectual improvement in an hypo-thyroid individual, there is nothing dramatic in all this. Although there are some fluctuations, data like those presented in Figure 2 indicate that one just does not outgrow feeble-mindedness. The hope of substantial improvement in intelligence by environmental control is misguided. The best way to get geniuses is to breed them, and the best way to decrease feeble-mindedness is to employ eugenics.[5]

All this does not reflect in the least upon the importance of education, which gives potentialities a chance to develop. Without education, the individual would not reach his ceiling. In the last analysis, the individual is definitely limited by the intelligence that he has inherited, although a good environment gives these potentialities an opportunity to manifest themselves and reach their maximum. The actual modifications that take place in school and outside life are mainly in the way of acquiring new knowledge and skills and developing attitudes rather than in changing actual capacity to any pronounced degree. Intelligence tests will give the school personnel a good notion of the potentialities of the individual pupil and make possible effective adjustment to the individual differences.

---

[5] For a review of this problem of stability of intelligence see Thorndike, R. L., "Constancy of the I.Q.," *Psychological Bulletin,* 1940, 37, 167–186.

School Adjustments to Individual Differences in Intelligence

Correlation of intelligence and school progress. In many school populations there is a very wide range in intelligence. In one fifth-grade class, for example, intelligence quotients spread from 75 to 118. The educational system should adjust to, and take advantage of, these wide individual differences. The problem is especially significant because of the correlation between academic progress and intelligence, which has been incontrovertibly established. At the Ohio State University, for example, there is a correlation of .64 between the intelligence test that the students take at entrance and their point-hour ratio, which is a sort of average of the academic grades they make. Correlations larger than this are usually found as we go down to the lower grades in the school system. It is probable that the intrinsic relation is even higher, but other variables enter at the university level. Many students spend an undue amount of time in outside activities—athletic, dramatic, or social—with the result that their academic performance does not measure up to the limit of their potentialities. On the other hand, some mature students of mediocre ability are very well motivated and make a supreme effort to use every bit of intelligence that they have. In the secondary schools these extraneous variables are not as pronounced, and usually the intrinsic relation between intelligence and school achievement comes out more clearly. Some of the pupils in a schoolroom, by virtue of their higher capacity, can progress more rapidly, do better work, and achieve a higher limit.

Until educators knew about these individual differences and their significance, it was common practice to treat all pupils alike. The brighter ones were held back and were bored by repetition of material that they could get more rapidly than the average pupil. The dull children fell behind the group and became discouraged and emotionally maladjusted. Nowadays most schools take some cognizance of these individual differences.

Rate of promotion. An obvious adjustment to the problem of varying capacities is a somewhat flexible system of school progress. Many bright youngsters skip a grade. This is advantageous up to a certain point, but if a child skips too many grades, he is associated with other children who are physically and emotionally much ahead of him. He has to play an inferior role in games and athletics, is left out of their social functions, and in many ways feels himself an outsider. Unless there are compensating factors, he may develop an unfortunate mental attitude. Similarly, if a person is retarded several grades, he may be the biggest person in the group; he feels out of place; the other children may look askance at him; and he may compensate by bullying them physically and become all the more unacceptable to the group with which he has hours of contact daily. Thus, there are limits to this flexibility in promotion, and the teacher should be alert to attitudes and mental adjustments with a view to determining when the matter has been pursued as far as is profitable.

Sectioning. If a school has a large number of pupils in a single grade, it is feasible to section them. They may be divided into two or more groups, each of which is somewhat homogeneous in intelligence. They may be divided, likewise, on the basis of other factors such as reading ability. A given group can then progress at a uniform pace, and none of them will get appreciably ahead or behind the rest. Those in the brighter section usually are not taught new subjects that are ordinarily taken in later grades, but are given a more enriched curriculum in those things which are the normal content for that particular grade. Those in the lower section, on the other hand, are held to minimal essentials with some branching out into more enriched materials when time permits. Some teachers of a lower section make the mistake of attempting too much, and do not give sufficiently thorough training on the minimum essentials. When children still lower in intelligence and at the borderline of feeble-mindedness are considered, even sectioning and following the minimum essentials is inadequate. It may be preferable to give simple vocational training.

In these multiple-track plans difficulties sometimes are encountered in the attitudes of the pupils. The members of the brighter section, if they know that they are brighter, may be inclined to look down their noses at the pupils in the dull section. However, it may be possible to develop a wholesome attitude toward this matter of sectioning. People may appreciate the fact that different pupils are destined to attain different levels just as some persons are better adapted to one job than another. If the school is thought of as an institution that is helping the individual realize his potentialities and fit into society ultimately in the place where he can be most effective and happy, then such things as multiple-track plans will be accepted with equanimity. Variations in the educational treatment of different individuals will be appreciated as in the interest of those individuals and will carry no stigma.

Acceleration. Interesting projects have been developed with superior students at the college level which might conceivably operate at somewhat lower levels. These projects endeavor to make it possible for such students to proceed with the material of a given course more rapidly. It is not a question of working overtime but, quite the contrary, of actually spending less time in the classroom but covering the ground just as effectively. Out of some six hundred students enrolled in a course in educational psychology, two sections were made up of students selected on the basis of superior native ability as indicated by an intelligence test and their academic background and motivation. They met three times a week instead of the usual five. An acceleration seminar composed of very superior students who had been still more carefully hand-picked, on the basis of interviews in addition to the objective records, was organized also. This last group had only six intensive two-hour evening sessions during the quarter. The regular students had about fifty to fifty-five hours in class. Grades on an objective final examination in the course were compared for 175 students in the regular classes, 36 in the accelerated sections, and 17 in the seminar. Of the first group 27 per cent made "A" or "B" grades on the final examination; 53 per cent of the students in the accelerated sections made such grades, and 94 per cent of those in the seminar.[6] The experiment indicates what is possible, at college levels, in the way of capitalizing superior innate capacity and background, and suggests similar possibilities at the high-school level, at least.

Individualized instruction. An ideal educational program from the standpoint of individual differences in aptitude would be complete individualization of instruction, since each child, in a way, does constitute a different psychological and pedagogical problem. This is seldom feasible financially and has the further disadvantage that social development might suffer. It is possible, nevertheless, to take some steps in that direction. There are arrangements, for instance, whereby students with workbooks can do a good deal of self-instruction, which in turn can proceed at a rate adapted to their individual capacity. An arithmetic manual explains a certain procedure, illustrates with examples, and gives practice exercises. After doing a certain amount of these exercises, the pupil gives himself a test that is provided. Perhaps he has the teacher time him. The pupil scores the test himself and looks up his score in a table of norms. Then, he reads, "If you are not satisfied with the score you made on this test, work on these exercises on page 17, and then take the test again." A serious pupil with some insight will check on his own progress this way, and if he needs some more practice, take it, and if he does not need it, go on to the next section. Thus he can progress at a rate adapted to his capacity.

---

[6] Klinesmith, M. A., "An Honors Seminar as a Method of Acceleration," *Educational Research Bulletin,* 1946, 25, 13–18.

Group projects. Another scheme for allowing individual differences to function is to assign to a small number of pupils a project that they pursue partly as a group, but to a considerable extent individually. For example, they may study transportation; they gather their own materials individually, write up reports, and finally pool their information and experiences.

Manual skills. At the low end of the intellectual scale individualized instruction may be concentrated on some simple skill that will be of subsequent vocational use. For some pupils experience with the ordinary academic subjects is wasted because they will not be capable of using those subjects in later life and probably will not retain much of them. If a child on the borderline of mental defect is a complete failure at arithmetic, it is foolish to try to force it into him. Some teachers of the intellectually backward pupils have a misguided enthusiasm and attempt the impossible. The writer knows a teacher who took on a feeble-minded youngster for some special instruction in her spare time, and spent the better part of a year in teaching him to read five words. She felt that she deserved great credit for having achieved this goal. If, however, we balance the probable utility of those five words against what the teacher might have done in that time, her contribution is somewhat questionable.

Intelligence and level of occupational aspiration. The problems of individual adjustment should be considered further with reference to the ultimate objective of the pupil. We shall see later that intelligence imposes definite limitations on the occupational level one is likely to attain. Professional people average highest in intelligence, business and clerical people come a little lower, skilled workers are definitely below them, and the unskilled laborers average lowest in this respect. This finding indicates that success in certain types of work requires a certain minimum intelligence, and those who lack this intelligence tend to be weeded out along the line, with the exception of the occasional person who survives by extreme effort. The implication is that pupils of high intelligence are more apt to attain a professional, business, or clerical objective in life. Occasionally the teacher may be asked about some particular job or about the relation of a school subject to a life situation, and she may be in a position to guide interests toward those careers. If backward pupils begin to show aspirations for professional or clerical work, it may be possible to divert their interest toward things of a more mechanical character, which may forestall subsequent unhappiness when they decide on an actual vocation that they cannot achieve. If they are shown certain interesting aspects of jobs that are less intellectually exacting when they are younger, it may be a very good start toward their subsequent vocational adjustment.

Other Educational Uses of Intelligence Tests

Surveys. It may be profitable to survey the population of different schools and determine the general level of raw material. In the same city, one school may be heavily loaded with intellectually inferior pupils, and another school may have a higher level of intelligence. This difference has some bearing on the selection of teaching personnel for those schools. There are some teachers who seem to have a flair for working with the retarded individuals, whereas others do their best work in stimulating high-grade pupils.

Check on effectiveness of instrucion. The correlation of intelligence with school progress gives an indirect indication of the effectiveness of instruction. Standardized tests in school subjects are available. There is normally a high correlation between scholarship and intelligence, and this correlation is higher if each student is motivated to use all his innate capacity in the educational program. A good teacher will be effective in providing this motivation. Thus, if we find a high correlation between intelligence and school achievement in a given schoolroom, the implication is that the teacher has done a good job.

Tests of Special Aptitude

The distinction has been made between tests of general aptitude and tests of special aptitude such as coordination, dexterity, memory for numbers, ability to judge distances, ingenuity, and the like. These latter tests play their main part in vocational adjustment and employment problems; however, there are a few instances in which some of them are of use in an educational situation. A widely used test of musical talent to measure discrimination of pitch, intensity, time and rhythm, and tonal memory is administered by means of phonograph records that play pairs of slightly different notes, and the subject indicates which he thinks is the higher, louder, and so on. Some other musical tests require the child to sing simple selections while the examiner notes whether he flats or sharps, transposes, omits notes, and the like. These judgments, of course, are subjective and as a result somewhat inferior. In the graphic arts tests may be directed toward art judgment. Groups of pictures of the same scene treated in several different ways may be presented; one may lack balance and another unity. When the subject chooses the one he thinks the best, his choice is measured against predetermined standards to determine his artistic taste. Other tests may involve problems in perspective or in light and shade.

Proficiency Tests

Passing mention should be made of proficiency or achievement tests in order to maintain continuity and to clarify subsequent consideration of them. They measure proficiencies that have definitely been acquired, and include tests in school subjects such as geography or arithmetic, which have been standardized and published (*cf.* Chapter 6). We shall also encounter proficiency tests in the industrial field in the form of trade tests, where it can be ascertained whether a person is competent as a carpenter, electrician, or truckdriver.

Summary

The educational system is deeply concerned with individual differences in the intelligence of pupils. Various tests are available for the measurement of intelligence. The Binet test, the most widely used, is standardized in terms of mental age. The intelligence quotient is the mental age divided by the chronological age for children. For adults the denominator of the ratio is taken as sixteen because that is the point at which intelligence levels off for the average individual. Group tests with multiple-choice responses are available for more expeditious measurement of intelligence. Performance tests may be used for illiterates or persons otherwise handicapped by verbal aspects of the test. In addition to the usual tests of abstract or verbal intelligence, there are also available tests for both mechanical intelligence and social intelligence (the general capacity for dealing with things and people respectively).

If a distribution is made of the frequencies of different intelligence levels in a large sample, the results conform to the normal frequency curve. At the upper extreme is genius and at the lower end feeblemindedness which, in turn, may be divided into morons, imbeciles, and idiots in descending order. Mental age increases along with normal growth into the 'teens where it levels off. Growth does not eliminate, but rather accentuates individual differences in intelligence. The consensus is that the intelligence quotient remains relatively constant throughout the individual's period of mental growth.

The school system has various problems in regard to adjustment to individual differences in intelligence. Some of these stem from the fact that there is a fairly high correlation between intelligence and school progress so that the brighter pupils can progress more rapidly. One method of adjustment to this fact is to let the brighter ones skip a grade; another is to section pupils in a given grade on the basis of intelligence so that the brighter group can progress more rapidly. It is important, however, to forestall difficulties in social development that may arise from too much acceleration. At the higher academic levels an intellectually superior group may cover the ground with fewer class sessions. A certain amount of individualized instruction may be possible in small school systems, and devices for self-instruction facilitate the pupil's progressing at his own rate. Group projects sometimes are useful. With intellectually inferior pupils emphasis upon simpler skills may be desirable. Intelligence tests are also useful for surveying school populations and for checking on the effectiveness of instruction by noting the correlation between intelligence and academic grades.

5

OTHER INDIVIDUAL DIFFERENCES OF SIGNIFICANCE FOR EDUCATION

Emotional Factors in School

THE CHILD HAS many experiences with an emotional overtone, which may range from a rather mild pleasantness or unpleasantness to a profound and disrupting rage or terror. An infant has innate tendencies to respond emotionally to only a limited number of stimuli, but he readily develops conditioned emotional responses to many objects and situations. It is through this mechanism that a child comes to like the school and the teacher or to develop hostile attitudes toward them. It is easy for the emotions aroused by one stimulus to transfer to some other. Maladjustments at home may carry over into the schoolroom situation.

There are changes in emotional patterns with increasing age. A study of worries as indicated in a checklist revealed that worrying about fire decreased consistently from the early school years up to college; worry about examinations increased until the early college years, and then dropped off; worry about personal appearance continued to increase throughout the academic range under investigation for boys, but for girls it leveled off somewhere around the tenth or eleventh grade; whereas worry about one's own ability seemed to increase gradually right through to the end of the academic program.[1]

Emotion as a symptom. To an external observer there may be no obvious connection between an emotion and the attendant circumstances. If an episode occurs in the school situation, the teacher should regard the emotion as a symptom of something wrong, much as the physician finds a patient with a temperature of 102 degrees, and then uses that, with other symptoms, in making a diagnosis. The child may become angry when required to do some particular assignment, whereas the actual difficulty is that he was not allowed to play first base in the ball game at recess. The teacher should be alert to such underlying causes of emotion.

---

[1] Pressey, S. L. and Robinson, F. P., *Psychology and the New Education*, page 168. New York: Harper's, 1944.

Emotional difficulties in school. Several causes of emotional difficulty that may be encountered in the school situation will be noted. Some children find it hard to adjust to a new school or neighborhood. A boy has to fight his way into the gang, or at least is regarded as an outsider until he has demonstrated some special competence. In the new schoolroom itself, the child must become adjusted to new teachers and new pupils. If this adjustment is not satisfactory, he may crawl into his shell or, on the other hand, become overly aggressive or mischievous in an effort to attract attention and secure some kind of recognition. The problem is all the more acute if he attends school away from home and does not have even the continuity of the home circle during this period of readjustment.

At the adolescent period adjustment to heterosexual life creates problems. A boy begins to want to impress the opposite sex, but at the same time his voice is changing and he is overgrown and awkward so that he becomes an object of derision rather than desire. This results in worry and frustration.

Difficulties arise from actual school failure, particularly if it is repeated. The child may develop attitudes of inferiority or may compensate by some kind of overactivity—belligerency or truancy.

At the late high-school or college level there may be conflict between a vocational objective imposed by parents and the pupil's own inclination. The writer recalls a college student who was failing a premedical course that he was taking at the insistence of his father. The father had wanted to become a physician but, since he had been unable to do so, he was determined that his son should achieve that objective. The youngster, on the other hand, wanted to be a concert pianist and was taking music lessons secretly. Another difficulty is a discrepancy between the pupil's level of aspiration and his actual potentialities. If a person sets his limit impossibly high and lacks sufficient insight to realize his limitations, he may become frustrated, moody, or even give up altogether.

In such cases the logical procedure is for the teacher to work on causes rather than to treat symptoms, just as the dentist fills the cavity instead of merely administering an analgesic. While the youngster is getting adjusted to the new school and the new neighborhood, the teacher should go out of her way to give him special help in his academic work and to make sure that he understands everything that is required of him. If the other pupils do not accept him, she may discover some particular competence of his and get him into a group or committee where it will give him prestige. Adolescent heterosexual adjustment may require some sex education, especially if the home neglects it. Emotional disturbances due to school failure may be mitigated by a guidance program or by sectioning so that the deficient pupil is put with others nearer his own level. If the parent has imposed an unwise vocational objective, he should be reasoned with. The teacher may also counsel the pupils about reasonable levels of attainment.

The teacher must avoid the involvement of her own emotional reactions in the adjustment situation. If she becomes angry, the pupil may reciprocate in kind. There should be a patient and objective attitude toward the problem. Moreover, she should be on guard against a positive emotional fixation of the pupil toward the teacher. This is especially apt to occur if there is little difference between the ages of the teacher and students. In such cases, it is helpful to interest the pupil in some other persons of his own age whose association he may find congenial.

Slightly pathological conditions. The emotional stress aroused by school situations may border on the pathological. Such difficulties will be discussed in a broader setting in Chapter 10, but at the moment it is well to mention some that may manifest themselves in school. *Neurasthenia* may develop in the pupil who fails repeatedly in competitive situations and then gets sick and emotionally exhausted. This may amount to invalidism so that the child is kept home from school and actually does escape discomfiture by his rival. *Running away* from a difficulty is a common solution, of which truancy or quitting school altogether are instances. Other children *daydream* to excess and in these flights of imagination accomplish things that they cannot do otherwise; others get their escapes and vicarious wish fulfillments in moving pictures, or in reading sentimental stories, or in religious activities. These escapes are not serious except in the case of a profound moving picture addict or religious fanatic, but there is a point beyond which they become unsatisfactory modes of adjustment. Another mechanism is *rationalization* in which the person works out an incorrect explanation which, to some extent, fools himself and his friends. Perhaps he failed to win a prize in school but decides that it would have been sissy anyway. This is sometimes called the "sour grapes" mechanism. *Compensation* as an adjustment mechanism is typified by a pupil originally from the country who feels socially inferior to the urban children and compensates by talking loudly or wearing extreme clothes in order to attract attention. In reality he is frantically trying to conceal his difficulty but overdoes the attempt. A person who is small of stature compensates for that by being argumentative or by driving his automobile recklessly. Emotional maladjustments often result in seemingly *hysteroid reactions.* A boy frequently became nauseated in school, particularly when the teacher scolded him. He had been receiving very little attention but once became sick in school, received a lot of sympathy, and became the center of attention. Thereafter he employed this device whenever he craved attention. *Regression* is a tendency to revert to some earlier habit such as weeping in a situation that really does not warrant it at all. *Projection* involves blaming someone else. The pupil doing poorly in a subject because of his own inadequacy or unwillingness to devote sufficient effort complains that the teacher is no good, thus projecting the difficulty upon her. *Stammering* is often traceable to emotional causes. Many children do it when they are embarrassed, and there are plenty of opportunities for embarrassment in school. A boy who was slow in speaking was hurried by the teachers until he developed the habit of stammering in school in the presence of middle-aged women. When he went to college, a wise counselor managed to get him in classes with male teachers and also arranged to have him talk occasionally with a sympathetic middle-aged woman who understood the situation. The boy soon recovered.

The maladjusted individual often strikes at the obstacle somewhat blindly. This may take the form of belligerency as in the case of a boy whose father had been in the penitentiary and who was twitted about this fact by his fellow-pupils. He began to get rough with the other pupils and throw rocks at them. Belligerency may be directed against the object causing frustration or against some substitute for it—kicking the hat belonging to a disliked person—or it may be directed against anyone who is in the vicinity.

In cases where the emotional disturbance borders on the pathological, the school's procedure should be much the same as that mentioned earlier in connection with the less pronounced emotional deviations. The important thing is to get at the real cause, and then see what can be done about it. In the more serious cases the teacher may not be able to handle the matter herself, but will need to refer the problem to a school psychologist or some other expert. She should have at least sufficient insight to appreciate the need of this expert help.

Disciplinary problems. Many of the foregoing emotional difficulties create disciplinary problems and a few additional sources of such problems may be mentioned. For one thing the conventional school routine involves repression of the individual pupils. After all, we are social animals and a group of youngsters sitting up straight, disregarding each other, and focusing their full attention on the teacher at the front of the room is a bit at variance with natural social behavior. The situation is further aggravated if the material presented is uninteresting. The child is often called upon to do things which to him are meaningless. He deals with numbers in the abstract rather than with dimensions of familiar objects in his environment; he is interested in problems of the modern world, but spends his time in the Age of Pericles. This discrepancy does not imply that everything should be sugar-coated. There are times when a person needs to learn to do a thing for the sake of an ulterior end. There are many life situations of this sort and the school is supposed to prepare the pupils for life. Actual disciplinary training is all right in its place, but it can be overdone. Some of the more progressive schools minimize repression by having the chairs and tables movable and allowing the children to work in social groups on various projects. In this way they get a social outlet and some social training as well as the conventional education.

Another contribution to the reduction of disciplinary problems is frequent success experiences. If the pupil is continually failing and never getting anywhere, he seeks other outlets and causes trouble. Even though his classroom efforts are meager, they should, nevertheless, he given a semblance of success and be so recognized by the teacher. Commendation for a mediocre performance is often justified in the interest of success experience.

If the school situation has any unusual elements that thwart the individual, they may cause disciplinary difficulties. In one instance a couple of the youngsters were seated where a post obscured their view of the blackboard. One of them suddenly adopted the expedient of climbing the post, and the other followed suit. The situation quickly got out of hand until a more experienced teacher took over and ignored the climbers until they became fatigued. Then she ascertained the real difficulty and had the class move the seats around so that everybody could see. Disciplinary episodes often spread through imitation. It is well to be alert and nip them in the bud.

Finally, the attitude of the teacher herself may be a cause of emotional distress and disciplinary trouble. If she plays favorites or is overbearing, there are apt to be emotional clashes. An investigation was made of about 4,000 high-school seniors as to the characteristics of the best liked and least liked teachers with whom they had had contact. For the former group, the leading characteristics in order were: helpful with school work; cheerful and jolly and can take a joke; human, friendly, and companionable; interested in and understands the pupils. The most frequently mentioned characteristics for the least liked teachers were as follows: cross, crabby, nagging, sarcastic, losing temper, not helpful with school work, work not planned, has favorite students and picks on others, haughty, overbearing, does not know you are in class.[2]

Interests

Importance. Along with the intellectual and emotional development of a child, there are changes in his interests. These are of concern to the educational system in two ways: for capitalizing on some and for arousing others deliberately. It is often possible for the school and the teacher to use many interests as they arise in motivating the students in their educational program—for example, an interest in running with the herd might be channeled into some kind of nature study club. There are certain other interests which it is desirable for the school to arouse deliberately for ulterior reasons—interest in art, or music, or literature. Techniques that contribute to this arousal are: exposing the children to appropriate situations, providing an enthusiasm that they may imitate, or even employing suggestion in subtle fashion. We shall note first some of the possibilities of evaluating or measuring interests and then see how they may be utilized or fostered in the educational situation.

Inference of interests from activities. If interests are to be controlled for practical purposes, it is desirable to evaluate or measure them in some fashion. Some crude evaluation may be done by watching youngsters play or by questioning them about the activities they find most enjoyable. Boys at the age of five may play with blocks or small wagons; at ten years, they engage in football and baseball; at fifteen years, basketball, football, and baseball; and at twenty, they are interested in watching athletic performances and in girls. Girls of those same respective ages begin with houses and dolls; then piano, movies, funny-papers, and dolls; then reading books, attending movies and dances; and finally, dancing, playing the piano, and having dates. The obvious trend is from individualistic to social to sex interest. Incidentally, sex differences in interests should be interpreted carefully because of the way our culture imposes certain interest patterns. Little boys are given mechano sets and little girls are provided with dolls simply because those are things in which they are supposed to be interested. When the war industries had a pressing need for personnel, they put women in mechanical jobs with some qualms because women were not supposed to have much mechanical aptitude. These qualms were entirely unfounded and reflected a confusion between aptitude and interest. Girls had shown little interest in mechanical things because they lacked opportunity for contact with them, but the mechanical aptitude was there all along.

---

[2] Brown, J. F., *The Psychodynamics of Abnormal Behavior*, pages 71–79. New York: McGraw-Hill, 1940.

Further information regarding interests may be obtained by noting preferences in reading, movies, or radio programs. With advancing age, boys showed an increasing interest in reading sports, general news, and editorials, whereas the girls, as they grew older, became more interested in news and society items. Similarly, there was a decreasing interest in Western movies for both sexes and an increased interest in romantic pictures, particularly on the part of the girls. Incidentally, children do find moving pictures exciting. Children at a public institution had devices attached to their beds, which recorded the actual amount of movement during the night, to obtain an index of restlessness. After seeing a moving picture, they were as restless as after having two cups of coffee.[3] There was a trend, with increasing age, toward greater interest in popular dance music in radio programs on the part of both sexes. Thus, the data on media for publicity and entertainment show somewhat the same trend as indicated by play activities—the gradual shift from individualistic to social interest and finally to sex interest.

Instead of asking the individual about his preferences, we attain more objectivity by asking about things he has actually done. The fact that he has made numerous mechanical things suggests a mechanical interest. To check on social interests we may inquire about his experience in clubs and attendance at dances or the kinds of games that he has played. There is some danger that when a person is asked to evaluate his own interests, he may govern his answers by his idea of the use that will be made of the information. This is especially true of adults and indicates the desirability of objective checks to supplement the subjective testimony.

Interest tests. A technique which stems from the personal inquiry method is an objective test on information about possible objects of interest. If a person is interested in baseball, he will know about leading players and batting averages. If he is interested in amateur radio, he will know ham terminology and abbreviations. Thus, a test of information about baseball or amateur radio matters would be an indirect indication of interest in these fields.

---

[3] Renshaw, S., Miller, V. L., and Marquis, D. T., *Children's Sleep*. New York: Macmillan, 1933.

A widely used test is Strong's Vocational Interest Blank. This consists simply of a long list of items next to each of which the subject indicates whether he likes it, or dislikes it, or is neutral toward it. The items include the following: vocations preferred regardless of salary; amusements like golf, fishing, hunting; such school subjects as algebra, agriculture, arithmetic, art; activity items like repairing a clock, making a radio set, adjusting a carburetor, handling horses; peculiarities of people —progressive, conservative, energetic, absent-minded, or optimistic. There are also alternative activities such as developing the theory of operating a machine *versus* playing baseball. The crux of the matter is the technique for scoring the responses. Scoring patterns for thirty-odd types of vocational interests have been developed. A brief excerpt will suffice to illustrate the method. Data were collected from a large number of men in a variety of occupations as to the frequency with which they checked each individual item in a certain way. Then for a group of engineers who took the test an item analysis was made to determine items which differentiated engineers from non-engineers, or men in general. If, on the item "looking through a telescope," 70 per cent of the engineers indicated that they would like to do it, and only 20 per cent of the non-engineers liked it, this was a differential item. If, on the other hand, the item "watching a ball game" yielded 68 per cent and 65 per cent for the respective groups, it was not differential and was discarded as far as the engineering scoring pattern was concerned. Thus, a considerable number of differential items was selected and roughly weighted according to the degree of difference between the two groups on a given item so that a pattern resulted that was useful in differentiating the engineers from other people with respect to their basic interests. Since there are several hundred items in the test, it is difficult for the subject to figure out the "best" way to mark them or to fake any particular interest pattern, and he is inclined to mark according to the way that the items actually impress him. The scoring patterns devised in this fashion have been mainly at the professional level. The usefulness of the test in the school system is limited primarily to situations where a vocational problem is involved (*cf.* Chapter 8).

Statistical Significance of Differences

A statistical consideration implicit in the foregoing technique should be discussed at this time for it will be involved in a good many other situations throughout the book. In the example cited it is obvious that the difference between the 70 per cent of engineers and 20 per cent of non-engineers who marked the item about the telescope would be a clearly significant difference. There is very little chance that it was purely accidental because of the particular sample of engineers involved. If, however, the percentages had been 70 and 50, one could not be quite as certain. With smaller and smaller differences, a point is reached where the differences are not really worth considering. The problem is to determine just where to draw this line mathematically. The fundamental consideration is the probability that, if the observations were repeated or another experiment was run with further samples, the difference obtained would still point in the same direction. Specifically, if other groups of engineers and non-engineers took the test, what is the probability that more of the former would still prefer looking through a telescope? This probability can be ascertained by computing what is termed the standard deviation of the difference. The formula is:

$$\sigma_{diff} = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2}}$$

where p_1 indicates the percentage of engineers liking the item, q_1 the percentage of engineers who did not express a liking for the item, N_1 the number of engineers, p_2 the percentage of non-engineers liking the item, q_2 the percentage of non-engineers not expressing a liking, and N_2 the number of non-engineers. The actual difference divided by this standard deviation of the difference is termed the *critical ratio.* If this ratio is 1.0, that is, if the difference is equal to the standard deviation, we know from the theory of probability that the chances are about 84 out of a 100 that if we repeated the study with other samples, the difference would still be in the same direction. No statistician would assume under those circumstances that he was dealing with a real difference. If the difference is twice the standard deviation, the chances are 98 out of 100, and if the critical ratio is 3.0, it is almost certain that the difference would not be reversed upon a repetition of the investigation, and we would consider it statistically significant. Few statisticians would attach much significance to a critical ratio much less than 2 and usually they hold out for a ratio of 3 before assuming significance. The same principles (but a different formula) are employed to interpret the significance of the difference between two averages or means. The details of the underlying theory will be presented in Appendix 2.

Underlying basis for changes in interests. It is apparent that basic biological factors underlie some of the interests and changes in interest which we have been discussing. Normal youngsters have a healthy activity drive which urges them on in the active rough and tumble interests of early life. To a lesser degree, there is developing a gregarious tendency which leads them to work with other people in a social situation. Toward adolescence, with its attendant physiological changes, there arises an interest in the opposite sex. Social approval or disapproval serves to encourage or discourage the active pursuit of certain interests, for example, athletics. Tests such as Strong's indicate a decrease of interest in things involving physical skill and hazard in the later years, and a disinclination to change established habits or customs.

Capitalizing interests for school motivation. It is usually inadvisable for the school to attempt to block or oppose interests. They should be utilized in a positive way. In general, people will do better at things in which they are interested, and very frequently some basic interest that develops in youngsters can be capitalized on to motivate them toward some educational objective. The gregarious tendency, for example, can be diverted in the direction of a nature club, a Red Cross drive, or a home economics club. The original motivation was simply to get together and do something, but if the teacher can give the group some worth-while objective, it is probable that the members will get their gregarious outlet at the same time that they are pursuing this ulterior objective. Sex interest, when it appears, may be channeled into some educational end—a Glee Club including both sexes. It would probably be a mistake to attempt a contest like a spelling match between males and females; the participants would not be interested in sex rivalry at this juncture.

Curiosity is a strong interest motive, and the teacher may utilize it by bringing in a nondescript box and having everybody guess at the contents. After the curiosity involved in guessing, the class is set for a lesson about the geological or biological specimen. The collecting interest is ubiquitous and may be guided in the direction of collecting specimens for scientific study. Even wanderlust may be given an outlet in trips to the museum or a place of historical interest, which would provide a shift in interest to this other material. It is possible to give many of the specific interests that arise in youngsters a normal expression in some educational direction.

Facilities for development of interests. The school should provide facilities for the normal functioning of some interests as they develop, quite apart from any academic utility. After all, if one has an opportunity to pursue interests of a legitimate sort as they arise, it contributes to wholesome adjustment to life. If opportunities are lacking, frustration and resultant maladjustment may ensue. Therefore, the school may contribute to mental hygiene by providing normal outlets for interests. The playground is one such facility. It may be designed primarily for the recess period, but, in a crowded city district where there is little other open space, the school playground makes a distinct social contribution by keeping children off the streets. It is a mistake to put a high fence about the playground and lock it as soon as school is out. By the same token, some of the other school facilities that lend themselves to recreational pursuits should be available outside of hours. This is especially true of facilities in arts and crafts and places where one can pursue incipient hobbies. Dances sponsored by the school provide outlets for a social interest under somewhat better conditions of supervision than a night club. Athletics affords an outlet for energy and group activity. Incidentally, the opportunities for athletics and other extracurricular outlets should be available to as many pupils as possible. Sometimes, too much energy is concentrated on a single team which comprises just a few individuals, while the rest of the students merely watch. An extensive intramural athletic program has much in its favor.

Although it is desirable for the school to provide facilities for out-of-hours pursuit of interests by the school population, it should be noted in passing that it is also desirable to make these facilities available to the community instead of limiting them to the young folks who happen to be enrolled at the moment. The matter of leisure time activities for the out-of-school population is of profound social significance, because when people have narrow interests and little to do in their spare time they are apt to get into trouble. A large amount of delinquency can be traced to boredom and idleness. One study may be cited to show the paucity of wholesome leisure time activities, especially for people whose education was somewhat limited. This study was based on some 30,000 young people in Maryland between the ages of sixteen and twenty-four who were interviewed individually and described how they spent their leisure time.[4] Table 5 gives the results. The first column indicates different types of activities, and the second column gives the average per cent of the time spent in the activity indicated by young people whose education had not gone beyond the sixth grade. The third column gives similar data for those who had gone as far as the ninth, tenth, or eleventh grade, and the last column, for those who had gone to school four years or more beyond high school graduation. The most striking thing in the table is the large percentage of the time spent in loafing by those with the least education. Reading loomed fairly large in the other groups. If, in a particular school district, there are many persons like those indicated in the first column, the availability of school facilities for recreation, crafts, and the like might well make the difference between a high delinquency rate and a well-adjusted community.

---

[4] Bell, H. M., *Youth Tell Their Story*, page 166. Washington: American Council on Education, 1938.

TABLE 5

Percentage of Leisure Time Spent in Various Activities by Out-of-School Youth with Different Amounts of Schooling.*

	6th Grade or Less	*Grade 9, 10, or 11*	*4 or More Years Beyond High School*
Loafing	22	8	4
Dancing, dating	13	16	8
Individual sports	12	16	18
Reading	11	23	43
Team games	10	9	4
Movies	9	13	8
Hobbies	9	8	10
Other activities	9	4	2
Listening to radio	3	2	1
Quiet games	2	1	2
Total	100	100	100
Number of Youth	1,483	2,569	396

* Bell

Attitudes and Their Development

Importance. Attitudes are an important attribute of the pupil, which is often neglected by the educational system but has much to do with the person's subsequent behavior as a member of the community. An attitude is simply a "set," or a state of readiness, which gives a directive or dynamic aspect to the response to the object with which this set is related. For example, if a person has an unfavorable attitude toward a minority group, he is prepared to do something unpleasant to them when the opportunity arises. If he develops a favorable attitude toward a certain commercial product, he is ready to buy it on occasion. A dynamic mental state may be developed even toward a symbol—such as a flag—so that men will go out and fight for it. The consequences of attitudes developed by an educational program may be practically catastrophic—witness the indoctrination of the youth of Germany during the 1930's. The school has responsibility in this whole matter because it is inevitable that children going through the system will have many attitudes developed or modified by their school experiences.

Measurement of attitude. A necessary preliminary to the study of attitudes is the development of methods for measuring them. Some indication may be obtained by talking to a person, but attitude scales constitute the best available technique. Such scales consist of a series of statements which the subject checks according to whether he agrees or disagrees with them or is neutral about them. Sometimes, five alternatives are provided instead of three: strongly agree, agree, no opinion, disagree, strongly disagree. The statements themselves range from those which experts consider to be very favorable toward the matter under consideration down to those which are very unfavorable. For example, in a scale for measuring attitudes toward the industry in which one works, the following statements would cover the range: "This is the best place I ever worked"; "This place isn't so bad, but I don't like the boss very well"; "An honest man never has a chance in this company." Similarly, if the scale dealt with attitudes toward Zulus, the range might be covered by the following: "I'd be glad to have a Zulu live in the same apartment"; "Zulus don't bother me particularly"; "Zulus are the scum of the earth." A necessary feature is a number or scale value to go with each of the items. These values are obtained from the judgments of experts—scientists or persons interested in the particular field and competent to evaluate the items. A refined statistical technique[5] is employed, but what it amounts to roughly is that the expert selects the statement that he considers is absolutely the most favorable toward the industry or the Zulus; then the one that is next in order, and so on down to the most unfavorable one. These ranks are transmuted into actual quantitative scores by taking some account of the normal distribution curve (page 34). The final result is a series of statements for the subjects to check and a scale value for each statement. It is then necessary merely to add the scale values for the items checked by a given subject to get his total attitude score. If he has checked a lot of the favorable statements, there will be many large scale values to total, and *vice versa.* Such techniques as these are available for systematic study of attitudes. Some investigations, particularly in the educational field, have employed more casual techniques such as interviews or simple questionnaires as to likes and dislikes without any quantitative scaling.

Attitudes and age. Attitudes change appreciably with age quite apart from any deliberate influence that the school may exert. A simple investigation asked a large number of children "Of all the persons you have read about and seen, whom would you most care to be like?"[6] Fifty-eight per cent of the choices of the younger children from six to eight showed admiration for persons from their immediate environment. As the age of the sample increased, there was a tendency to admire historic and public characters, which culminated in 61 per cent of the choices at age twenty. Characters from fiction or religion received only scattered mention. One factor in this trend is that with increasing age, the youngster becomes sufficiently sophisticated to see the shortcomings of the local celebrities. This sophistication may be noted further in the fact that when girls were asked to check in a list the things they considered to be wrong, they checked a large number of items until well into high school when there was a sudden drop in frequency. Boys showed a more gradual decrease. In the adolescent years there is quite an emotional core in attitudes. Hero worship is a common phenomenon. Religious conversions show a peak around the age of sixteen. Habitual criminals commit their first crime at that age or a trifle later. A study of young Russian political leaders in the period prior to the second war found that most of them began their initial revolutionary activity at about seventeen, coincident with the emotional drive. Further studies of actual admired traits show that with advancing age there is a decrease in admiration of people who are quick, brave, or funny, and a consistent increase in admiration of those who are cooperative, broad-minded, and reliable.[7]

---

[5] See Thurstone, L. L., "Theory of Attitude Measurement," *Psychological Review,* 1929, 36, 222–241. Also Edwards, A. L. and Kenney, K. C., "A Comparison of the Thurstone and Likert Techniques of Attitude Scale Construction," *Journal of Applied Psychology,* 1946, 30, 72–83.

Biological factors often influence attitudes. A person who is physically small and perhaps dominated by other members of the family or the community may develop certain hostilities as a result. One who is vigorous and healthy will have a different slant on life from one who is frail and has to refrain from more robust activities. Physical handicap of a semi-crippling nature, a birth mark, or any attribute which makes the person feel that others are looking askance at him, may produce emotional compensations. Skin pigmentation is another of these biological factors.

Home. Inasmuch as a child spends much of his time in the home circle, particularly in the pre-school years, it is natural that his attitudes should be colored by home influences. Even before he completely understands what adults are saying, he will develop a favorable or unfavorable attitude toward certain names by noting the emotional setting in which those names are mentioned. Simple attitude scales have been administered to different members of the same families. In one such study the scale dealt with attitudes toward the church, war, and Communism. It was a simple matter to take the attitude scores on a given scale for pairs of mothers and daughters and run a correlation coefficient between the two: the correlation for attitudes toward the church was .69, for attitudes toward war .43, and toward Communism .49; the correlations between fathers and sons were of about this same magnitude. It is highly probable that the children acquired the attitudes from the parents rather than *vice versa.*[8] Sometimes, to be sure, the youngsters do not follow the home pattern, but deliberately revolt from it. A feature of home conditions that may color the attitudes of both parents and children is the economic aspect. People whose existence is somewhat marginal are inclined to develop an unfavorable attitude toward the society in which they live and are more interested in changing things. The "have nots" are more liberal because they feel that social change could not make things much worse for them, and might make some improvement, whereas, the "haves" are reasonably satisfied with things as they are, and thus tend to be more conservative.

---

[6] Hill, D. S., "Personification of Ideals by Urban Children," *Journal of Social Psychology,* 1930, 1, 379–392.

[7] Pressey, S. L. and Robinson, F. P., *Psychology and the New Education,* page 270. New York: Harper's, 1944.

Associates. Attitudes often are picked up from the cultural group—either geographical or economic—to which the individual belongs. It frequently takes the form of an unfavorable attitude toward some other group. Almost every town of any appreciable size has an East Side, or South Side, or some geographical region whose inhabitants are looked down upon by the rest of the community. A similar factor is the immediate social group with which the youngster is in frequent contact. Through the mechanisms of imitation and suggestion, he acquires the attitudes of his gang, or predatory club. These attitudes often deal with school work, and law observance or evasion.

Media of suggestion. Special mention should be made of media such as moving pictures, books, press, and radio which may be loaded with material that will influence attitudes. The effect of movies has been investigated by the general technique of giving children a standard scale involving attitudes toward, for example, a particular racial group, providing them with free tickets to a moving picture that shows that racial group in a favorable or unfavorable light, and then having them execute the scale a second time. A moving picture that was favorable to the Chinese yielded an average score prior to the showing of 6.72, and after the showing, 5.50, which was in the direction of a more favorable attitude. The critical ratio (page 94) was about 12, so the difference clearly was significant. However, another film that was favorable to the Chinese yielded a difference only 1.7 times its standard deviation. Similar results were obtained with films designed to change attitudes toward war.[9] The effect of the press on attitudes may be investigated in similar fashion. In one instance attitudes of students toward a foreign political personage who was to visit the country were measured. A series of editorials was then planted in the college paper, some of them favorable, some unfavorable, toward this person. Students were given copies of this paper to read, ostensibly as part of a long-time investigation of the psychology of reading. Some of them had the favorable editorials and some the unfavorable. When the attitude scale was applied again, most of the students showed a change in the direction anticipated; 98 per cent of those who read the favorable editorials did become favorably biased toward the person, and 86 per cent of those reading the unfavorable editorials were more prejudiced than originally.[10] Similar trends have been noted in investigations where the subjects listened to lectures that were deliberately designed to increase the favorable attitudes toward some particular racial group. Of course, as youngsters get older, they become more critical and may detect the speaker's strategy and make allowance for it. These media of publicity are, however, appreciably important factors in controlling attitudes. Organized governmental authority is aware of this fact, and utilizes them in many instances. Sometimes the school is confronted with the problem of falling in line with such a trend or doing something about it, depending upon the extent to which the educational and the governmental philosophies agree.

---

[8] Murphy, G., Murphy, L. C., and Newcomb, T. M., *Experimental Social Psychology.* New York: Harper's, 1937. (Data by Newcomb and Svehla.)

The school and attitudes. The school obviously plays a role in the development of attitudes of the pupils, whether it makes any effort to do so or not. Deliberate effort is made when the school takes the responsibility of an outright presentation of a particular point of view which it thinks the youngsters should acquire—such as the nationalistic indoctrination of German education in the 1930's. Another method is the influencing of attitudes by indirection. In a region where there is a considerable prejudice against some minority group, it is not so successful for the school to come out flatly and preach tolerance; however, it is feasible to present some of the interesting and desirable aspects of the group in question. A frequent approach is to stress their cultural contribution—music or folk dances—in the hope that if interest and appreciation of these cultural manifestations is aroused, attitudes toward the group itself will be improved.

---

[9] Peterson, R. C., *et al., Motion Pictures and Social Attitudes of Children and Conduct and Attitudes of Movie Fans.* New York: Macmillan, 1933.

[10] Annis, A. D. and Meier, N. C., "The Induction of Opinion through Suggestion by Means of Planted Content," *Journal of Social Psychology,* 1934, 5, 65–81.

The school exercises further influence upon attitudes through the textbooks. A history text can give a very definite slant along nationalistic lines. Occasionally, vested interests have made vigorous efforts to have a book eliminated from the schools lest it inculcate an attitude that they considered undesirable. Business organizations in a certain part of the country have attempted to eliminate a textbook's references to earthquakes or hurricanes in that region.

Another way in which the school influences attitudes is in providing facilities for pupils to investigate, and become exposed to, different things. Some high schools take over the city government for a day so that the youngsters can get a little experience in municipal affairs and, moreover, develop a slight attitude of civic responsibility. Similarly, the journalism class takes over the local newspaper, thus getting considerable insight into important public questions. In so far as the school fosters this type of thing, it is having an influence on attitudes.

Education *versus* propaganda. A much discussed, but perhaps trivial, point is the distinction between education and propaganda. The latter is often used in an opprobrious context. Propaganda is something that is of questionable value except when used to demoralize an enemy, whereas education is something positive and desirable in character. The writer gets the impression that if one is in favor of an effort to influence attitudes, it is education, whereas, if one dislikes it and disapproves, it becomes propaganda. Someone on the other side of the issue would just reverse the terms. The school sometimes makes commendable efforts to teach the pupils to consider both sides of an issue before reaching a decision. This may be achieved through debates or discussions of the town-meeting type. But beyond such specific efforts the school has a general influence in the development of attitudes and, therefore, its responsibility is great. The basic philosophy of the educational system in our present society is fundamental.

Character Education

Tests. Attitudes may be reflected in actual conduct, and the tendency for this conduct to conform to accepted culture patterns is termed "character." The school contributes to development of, and modifications of, character and, therefore, the educational psychologist with his broad concern for educational problems is interested in this aspect. His initial approach is psychometric. Ingenious tests have been devised for a number of character traits.[11] To check on honesty, the children were required to shut their eyes and put a dot in each of a series of circles of decreasing size. It had been determined by previous experiment how far one could go when actually blindfolded, and if children went appreciably beyond this point, it was obvious that they peeked. Again, in a situation where it seemed desirable to have read a lot of books, the children were given a list of book titles and were asked to check the ones they had read. Included in the list were some fictitious titles and the tendency to mark these fictitious ones was a measure of dishonesty. Altruism was sampled by arranging for the youngsters to come to school early and cut out paper dolls for the hospital children if they wished. The amount of time spent in this way was an indirect indication of that characteristic. Self-control was investigated by putting on each desk a small box with a simple combination lock. The children were told that they would be informed how to open the box and get the candy which was inside after the arithmetic lesson. The locks were all set at a predetermined point, and proctors going through the room during the arithmetic lesson could readily detect which locks had been tampered with. The length of time the child refrained from such tampering indicated his self-control.

Relation of other variables to character traits. Some of the variables related to attitudes have similar bearing on character traits. At the early ages there are improvements as the child gains more insight. A very young child cannot distinguish between truth and falsehood. The older youngsters, however, become more sophisticated about it and do not accept rules of conduct blindly. When they were asked at different ages whether there are instances in which "lies are necessary," the percentage of affirmative replies increased from about 15 to 45 per cent when advancing from the age of five to the age of twelve.[12] Intelligence is another factor. A correlation of .50 was obtained between intelligence and honesty as revealed by some of the tests just described.

Biological factors such as health and stature may play a role too. If there is some frustration in this respect, the individual may compensate by engaging in questionable types of conduct. The home also has much to do with formation of these particular behavior tendencies. If members of the family fight a good deal or are delinquent sexually, it is natural for the youngsters to follow suit. One girl admitted unhesitatingly in an interview that "the family always fight," and that when her mother hit her father over the head with a skillet she and the other children "laughed plenty." She also volunteered the fact that her mother had a "boy friend." Moreover, it is not always a matter of a broken home that causes trouble, but also of lack of sympathy, rejection of a child, favoritism, or the fact that insufficient time is devoted to the children because the parents are away or preoccupied with other things. Sometimes the youngster's conduct pattern develops from imitation of his play associates. If the group is doing questionable things, the newcomer is somewhat of a sissy if he does not participate. Many delinquent careers begin in this way. The media of publicity have a bearing here. A moving picture dealing with crime embodies a good deal of suggestion, and the youngster will often get the glamorous rather than the deterrent aspects on the basis of which the film is supposedly justified. The same thing is true of general social laxity as portrayed on the screen or of the distorted press publicity sometimes given to crime, scandal, and divorce.

---

[11] Hartshorne, H. and May, M. A., *Studies in the Nature of Character.* New York: Macmillan, Vol. 1, 1928; Vol. 2, 1929; Vol. 3, 1930.

[12] Tudor-Hart, B. E., "Are There Cases in Which Lies are Necessary?" *Journal of Genetic Psychology,* 1926, 33, 586–641.

Opportunity for practice. One major contribution of the school is the opportunity it provides for the individual to practice some of the characteristics under discussion. Habits of this sort are specific rather than general: neatness in dress does not necessarily go with neatness in one's handiwork. Some experimental investigations indicated that youngsters would cheat in their school work but would not cheat in an athletic performance. When a child is asked to define "honesty," he does so in terms of a specific situation. Thus, character traits must be developed in specific situations, and too much should not be expected in the way of transfer from one situation to another. It is possible to provide many specific situations in school; for example, promptness in returning borrowed things, or responsibility for money, or opportunities for helping someone else. During a war period, there are outlets such as victory gardening, collecting scrap metal, and selling bonds. In so far as the school can foster opportunities of this sort, it may be contributing appreciably to the development of these traits.

Development of Appreciation

Surroundings. The school system contributes to the development of appreciation, particularly in the fields of art, music, and literature and presumably should guide this appreciation in the direction of products which are generally regarded as more acceptable from the artistic standpoint. One effective procedure for developing a favorable response to the aesthetic is simply to expose individuals to it. If they see good pictures on the walls repeatedly, they may come to like them just through the sheer effect of repetition. The general appearance of the schoolroom in decoration and color is of similar significance, and trips to the art museum will help. Similarly, pupils can hear acceptable music either in concerts sponsored by the school or in broadcasts which are picked up. There is no control, unfortunately, over students' outside listening practice and people frequently express a preference for classical music when actually they listen more to non-classical. Nevertheless, some interest in good music may be aroused simply by making it available for listening in the school. The same mechanisms may operate with reference to good literature. However, the mistake sometimes is made of shooting over the pupils' heads with classic literature which is meaningless to them because it is beyond their vocabulary range at the time.

Acceptance. When children are exposed to good artistic or literary items, it is desirable for them to accept those items and act as if they liked them. Appreciation has a mild emotional component, and we noted earlier that emotions are affected by bodily expression. This acceptance on the part of the pupils may be facilitated by the teacher's enthusiasm; if she expresses interest in a painting and appears to like it, the pupils may imitate her bodily expression and thus get somewhat the same attitude. Acceptance may be induced by making the experience pleasant in another way so that some of that emotion will transfer to the item in question. If a trip to the art museum has other pleasant components—the social aspect and the interesting ride in a bus—the total experience is a pleasant one, and some of that pleasure transfers to the art objects.

Participation. If the children engage in some artistic or literary activity by themselves, so much the better. They may play classical music of the simplest sort and enjoyment from the mere accomplishment may attach itself to the music. If they take part in a worth-while dramatic offering it may serve a similar purpose. Sketching or painting may bring some insight into, and appreciation of, the artistic work of others. This is especially true if the child gets recognition for successful performance so that the whole experience is pleasant, and some of the pleasure is transferred to the art work itself. Occasionally it is feasible to have some type of group participation—the whole class turning out to redecorate the schoolroom or landscape the school grounds.

Social Development

One other development of the school child is of interest to the educational psychologist. After all, life is not spent in a social vacuum. We start out, to be sure, as individual animals, but sooner or later, we react to other people and make certain adaptations to the social scheme of things. An infant confronted with other infants apparently does not regard them as individuals, but more like toys until he reaches the age of a year and a half. At about that age there is a gradual increase in social play. Investigations have shown that with age growth there are gradual but steady increases in such things as looking for praise, going to an adult with criticism of others, competition, and even retaliation. It goes without saying that social development is desirable inasmuch as most people do have to live together in a cooperative society.

Social development in the home. Much social development, of course, takes place outside the purview of the school system. There is a long period of pre-school life which bears on the present discussion inasmuch as it contributes background up to the time when the school does take over. Favorable facilitation of social development can take place in the home, but, in many instances, a good deal of harm is done. One of the most obvious things is imitation of the parent by the child. A boy growing up with a shy father who spends most of his time in a basement workshop may develop some interest in mechanical things but is quite liable to become a recluse himself. A daughter growing up with an excitable mother may develop a predisposition to all kinds of tensions in social situations. Misguided efforts on the part of the parents may have serious consequences. A widowed mother who wants to keep her child to herself, brings up a girl who has very few contacts with other children, later attends a girls' college in her home town, and, by middle-age, is a spinster reference librarian in the back room. A favorite child is sometimes handicapped—as in the case of a girl who shows some artistic talent and is given advantages while her brothers and sisters are subordinated. She is the center of attention until she gets into outside situations where this is not possible, and then she develops tantrums. In another home a step-mother dislikes the children as a reminder of the former wife, and the dislike becomes mutual. The conservative neighborhood disapproves of the arrangement anyway and practically ostracizes both parents and children so that they get no emotional satisfactions either at home or outside. As a result they develop suspicious, defensive reactions and finally take up with an inferior, delinquent group across the tracks, which will accept them. Then there is the old-fashioned, strait-laced home which represses activities that are largely accepted as part of our present-day mores. When a youngster from such a home starts acting like Sir Galahad with modern children, the resulting bewilderment can be imagined. One bit of experimental evidence may be cited to show the way that poor home treatment may be reflected in poor school adjustment. Children were rated by their teachers as to whether they had good social adjustment and work habits in school. Then, the homes of the children were visited by skilled interviewers who sized up the situation and discovered whether the children had been babied, pushed, or were well adjusted in their home. Stating the over-all results for second-grade and fifth-grade children, about three times as many who were handled in well-adjusted fashion at home were socially well adjusted and had good work habits at school, compared to those who had been babied or pushed at home. The home for the young child should provide affection and security but also should help rather than hinder the youngster in achieving status in child society. This last aspect is more difficult in regions where people live in large apartments with little community life. When dealing with problem children, the school should not take things at face value but should look for causes and often will find that the trouble lies with a maladjusted parent. When problem children are brought to psychological clinics, very frequently the clinician goes to work on the parents.

Nursery schools. Fortunate is the child who has the opportunity to attend a nursery school because the pre-school home life is often too simple from a social standpoint. Sooner or later, the child must break away from the parents, and a nursery school provides a satisfactory transition and avoids the more severe experience that often accompanies entrance into elementary school. The nursery-school personnel is usually aware of these problems, and perhaps the parent is encouraged to wait around the first day or two, on the side-lines as it were, and withdraw gradually from the scene. The teacher provides many interesting things to do and much equipment with which to play, and the other children themselves become interesting objects, particularly to a child who has had little contact with other children. If the child is inclined to play by himself, the teacher soon contrives to get him at least near the other children—in a sand box—or to get him to help another child perform some simple task. In some of the Russian nursery schools deliberate efforts are made to teach cooperation by providing toys which are so large that one child cannot handle them alone. If two youngsters seem to stick together too much, the teacher can induce them to join a larger group. The teacher of the nursery school may be regarded as a sort of hostess. This kind of schooling has very marked possibilities for social development.

Elementary schools. Many children come directly from the home to the elementary school and there make their début into child society. To some of them it is an almost traumatic experience. All too frequently, the school atmosphere is not conducive to social development because of its conventionally repressive character. The children have to keep quiet and avoid social contacts with other pupils during the school hours. The child who stays repressed is regarded as "good." Many a teacher would be favorably impressed by a child in the early stages of schizophrenia who was simply crawling into his shell. The overactive, somewhat mischievous child, although he may be a bit of a nuisance, is not a cause for alarm on the part of the educational system, and will probably work out his own destiny anyway.

Some elementary schools, fortunately, give definite emphasis to the social aspect. The children work on projects together; they sit around tables or in movable chairs so that little discussion groups can be constituted; they are encouraged to talk things over with their fellow students rather than to operate in intellectual isolation. After a bit of preliminary study of a topic, they have a round table or a committee meeting on it. Perhaps they go so far as to take some project, subdivide the labor of working up the details, and then pool the results. In all this there is considerable benefit from the standpoint of social adjustment.

Experiments have been conducted to determine what happens as the result of deliberate efforts on the part of the teacher to create a particular atmosphere, say, a democratic or authoritarian one. Small groups of ten-year-old children undertook such activities as mural painting, making maps, constructing model airplanes, and other tasks that involved planning, cooperating, and working together. The "teachers" were actually graduate students in psychology. One of them took charge of a group in autocratic fashion and told each pupil, one step at a time, just what to do and with whom to work, but did not participate in the work himself. A laissez-faire procedure was followed with a second group; the person in charge merely let them do as they pleased, with only occasional comments. The procedure in a third group was democratic; the project was discussed with the pupils and suggestions made when requested, but the youngsters themselves decided who would do what and with whom each would work. The experiment ran for six weeks with two periods a week. Then the procedure with the different groups was rotated. In the first group which had been treated autocratically, a new "teacher" took over with a democratic procedure and similarly for the others. The comparisons of most interest were between the democratic and the autocratic series. Skilled observers, unknown to the children, were watching and recording their behavior throughout the experiment. In the autocratic group there were thirty times as many episodes of hostility as in the democratic. If the leader left the room, work quickly fell off and there was much irritation among the members. In the democratic group, on the other hand, the work went on without interruption. In the autocratic system a boy worked by himself about twice as frequently as in the democratic. Toward the end of the experiment, the democratic groups voted that they would like to continue the program, but the autocratic groups voted negatively.[13]

The individual's status in the group. Quite basic in this problem of social development is the individual's tendency to "belong" to the group and his status in it. A little girl whose sister had achieved more distinction than she and had made better grades in school had that fact continually thrown at her and as a result developed a timid, defensive type of behavior. A teacher will do well to spot those children who do not seem to belong to the group and attempt to find something that they can do effectively to achieve status. There is experimental evidence of these differences in the status of children in the group. A typical "sociometric test" consists of telling the children that the teacher is thinking of moving their chairs around and asking each child to name two classmates whom he would like to sit near. The results may be analyzed diagrammatically as in Figure 3. The squares represent boys and the circles, girls. The arrows point toward the child chosen as a desired neighbor—the boy labeled *B* selected *C* and *F* as the two whom he would like to have as neighbors. Some interesting things are revealed by the

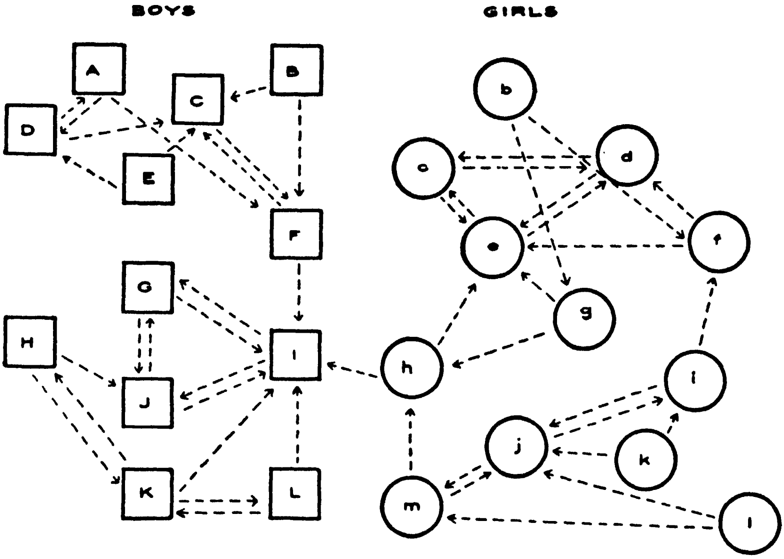


Figure 3. Social Structure of a Sixth-Grade Class.

---

[13] Lewin, K., Lippitt, R., and Escalona, S. K., "Studies in Topological and Vector Psychology," *University of Iowa Studies in Child Welfare*, 1940, 16, No. 3.

diagram. Several of the children *(B, E, b, k, l)* were chosen by no one; obviously they lacked the social qualities which would make them desirable to the others. One boy *(I)* and one girl *(e)* were chosen by six and five other children respectively. There was only one instance of crossing the sex line (these were sixth-grade pupils). The boys seemed to fall into two subgroups, one centering around *I, G,* and *J,* and the other around *A, C,* and *D.* When it came to the actual rearrangement of the seats, the teacher took account of these findings and attempted to locate the more isolated students so that they would begin to participate in the group through the person whom they themselves selected.[14]

Normal changes in social structure. The social structure of child groups shows some changes through the school years. The sociometric technique just described was followed in a large Brooklyn school. At the kindergarten level about 35 per cent were isolated—not chosen for a neighbor by anyone. This percentage decreased until about the fourth grade when it reached between 15 and 20 per cent and remained constant thereafter. The tendency toward mutual pairs, that is, where *a* chose *b* and *b* chose *a,* began at 7 per cent in the kindergarten and reached 25 per cent by the seventh grade with a little drop thereafter.[15]

The teacher's function. It can be seen that important problems of social development are implicit in school situations. The teacher has a responsibility particularly for the isolated child who shows inadequate social development. As in many other situations, the first *desideratum* is diagnosis. Without any sociometric test, the alert teacher can locate the individuals who are most in need of treatment. They will be seen wandering around the edge of the playground and sitting on the sidelines; they may also participate less in class discussion. Ingenuity is required in providing minor social situations in which the child can be induced to do something with the others. Group projects, putting the retiring individual on committees, giving him some assignment in which he has to go and get information from other people, finding something that he can really do well so that he may achieve status and be recognized for his merit by the rest of the group, will all contribute. There are no hard and fast rules, but the teacher may experiment with different techniques and usually can develop her own procedures for carrying out this important responsibility in social development.

---

[14] Pressey, S. L. and Robinson, F. P., *Psychology and the New Education,* page 220. New York: Harper's, 1944.

[15] Moreno, T. L., "Who Shall Survive?" *Nervous and Mental Disease Monograph,* 1934, Vol. 58.

Other agencies outside the school may contribute to social development. A teacher may inform some person in an agency with which the child has contact of his social problems. Typical agencies are youth clubs, community centers, and camps. The school should be alert to these social resources which may collaborate with the school system in promoting social development.

Additional features at adolescence. As the school child approaches adolescence, some additional social adjustment problems arise. Throughout childhood, one sex regarded the other one with indifference and often scorn, but now develops lively interest in it. To be sure, there are some sex episodes in childhood, but, unless alarmed parents handle them with frightful moralizing, they pass without any traumatic effects. At adolescence a significant point is the wide difference in the rate at which youngsters reach this level. Girls mature more rapidly at this age so that frequently their interest will be focused on boys a little further along in school than they are. Differences within the single sex are also considerable. A boy who is relatively late in maturing may be completely left out of the heterosexual activities of the group. The school must handle these situations in a wholesome fashion without undue repression and with the realization that this type of development is inevitable and necessary. The shift from primary to secondary school, which usually involves a variety of teachers rather than a single teacher, is another adjustment problem at this period. This may bring with it undue emotional tension between some teacher and pupil unless the teacher is alert to the danger.

Home complications. In a way, the adolescent is in the process of escaping from home, and conflicts with parents are frequent at this stage. Some of these conflicts may have serious consequences. For instance, a mother who had married hastily and unhappily was determined that her daughter should not make the same mistake, and tried to keep her away from all contact with the opposite sex. The result was that the girl soon lost popularity even with her own sex. Another youngster was not allowed to learn to dance or to play cards because of the fundamentalism of the family's religion with the result that he was left out of the school's social life. A woman who had her musical career cut short insisted that her daughter become a musical artist and made her practice to an unreasonable degree. Her accomplishment in classical music gave her little social status, and her interest in the music became less and less; however, her mother insisted all the more vigorously on inordinate amounts of practicing. The situation was ultimately saved when the girl went to college in a distant state "as far away from Mother as possible." If the school people become aware of difficulties of this sort it is possible to talk tactfully to the parents. The visiting teacher may be a satisfactory intermediary. When such difficulties are quite general in the school population, some discussion of the matter at a meeting of the Parent-Teacher's Association might be in point. If the parents who are most involved can be drawn into the orbit of the discussion, perhaps they will see that some of these things apply to them.

Other contributory factors. A few other factors contributing to social development at the adolescent level may be mentioned briefly. Physical factors play a role and, sometimes, set limits: lateness in reaching maturity is a limiting factor and personal attractiveness tends to promote social success. This fact poses a problem for the teacher who must provide some means whereby the pulchritudinously handicapped person can still achieve something which will make him acceptable to the group. Very often the people who most need the extracurricular activities are the ones who do not get a chance to participate in them. Some tightly closed social organizations that spring up at the high-school level are open to criticism on the basis of their exclusiveness and the frustrations aroused in those who do not get selected and who probably need the social experience most. Another thing that facilitates social adjustment may be termed "prestige-giving skills." Things which an individual can do well tend to give him status and make him more readily accepted by the group. Effectiveness in dancing, or swimming, or in the type of games that constitute the ordinary recreational pattern for the group, will all help. Another thing that contributes, in which the school can render some instruction, is simple social information and know-how and the ordinary amenities of meeting and dealing with people.

Finally, the school can provide varied opportunities for social experience. Some of these may occur in the actual classroom situation, particularly when the class is organized in somewhat democratic fashion. Other opportunities lie in dances, games, rallies, and general goings-on of an extracurricular character. Like it or not, these activities constitute an essential factor in preparation for life in our present culture and should not be completely submerged by conventional curricula.

Summary

Individual differences in factors other than intelligence are of concern to the educational psychologist. One of these is emotional development and the emotional manifestations which often occur in school. Teachers need to regard these emotional episodes as symptoms and to seek the underlying cause. Frequent causes of emotional difficulties in school include moving into a new neighborhood, getting adjusted to the opposite sex, repeated failure, conflict between a vocational objective imposed by parents and the pupil's own inclination, an unattainable level of aspiration, undue regimentation in the schoolroom, lack of success experiences, thwarting or frustrating physical situations, and the attitude of the teacher herself. More pathological manifestations include neurasthenia, running away from difficulties, excessive daydreaming, escaping through excessive attendance at movies or reading of sentimental literature, rationalization in an effort to fool one's self and others, compensation in the form of blustering or belligerency, hysteroid reactions when one cannot secure attention in any other way, regression, projection of a difficulty on to someone else, and stammering. Once the underlying causes have been ascertained, the teacher is in a position to apply remedies.

Interests are developing and changing throughout the school years. Indications of interest may be obtained by observing the activities of the children and finding what they like to do or read. Objective measurements utilize information tests or interest inventories in which a large number of items are checked according to whether one likes or dislikes them. A scoring pattern is derived for these items by noting the difference between the markings of a certain vocational interest group as compared with those of a control group. The school may capitalize interests as they develop. Gregarious and sex interests may be channeled into a group activity which has an educational objective. Curiosity about an object may pave the way for careful study of it. Interest in collecting things may be directed toward collecting science specimens. The school, moreover, should provide facilities for the normal functioning of interests. These include playgrounds, athletic facilities, and equipment for the pursuit of hobbies. Provision of opportunities for pursuit of interests by the out-of-school members of the community is commendable if the school is regarded as an agency for the total community. This may even reduce delinquency.

The educational system has some responsibility in the development of attitudes, and scales have been developed for their measurement. Such scales consist of statements with which the subject expresses agreement or disagreement, and a scale value for each statement is derived by statistical analysis of the judgments of experts. Attitudes show changes with increasing age and are influenced by biological factors. High correlations have been obtained between the attitudes of parents and children. One's associates also contribute to attitudes. Moving pictures, press, and radio play significant roles. The school may make direct efforts to inculcate a particular attitude or it may achieve its results by indirect procedures. Even the textbooks may contain items that will inculcate certain attitudes. The concept of attitudes may be extended to include character and, here, again, the school has a responsibility. Tests have been devised for traits like honesty, altruism, and self-control. Such traits vary with age and home conditions. The school may provide specific situations in which these traits may be practiced.

Appreciation of art, music, and literature comes within the purview of the school. One helpful procedure is the provision of surroundings which encourage aesthetic appreciation. It is desirable further for the children actually to accept these objects and to act as though they liked them. This may often be achieved by encouraging imitation of the teacher's enthusiasm. When pupils are actually participating in artistic work, the satisfaction of doing something successfully may be transferred to the product itself.

Social development should be promoted in the school although some takes place in the home during pre-school years where mistakes are often made. In the nursery school expert personnel is available to help the transition from home life to child society. Getting the children to work together is an important aspect of the program. In some elementary schools, unfortunately, regimentation minimizes social development. Experiments have shown that a democratic atmosphere produces more wholesome results than an authoritarian atmosphere. The individual's status in the group has important bearings on his social development. Sociometric tests reveal that some pupils are never chosen by others as desirable companions or neighbors. The teacher may do something to bring those less accepted pupils into group acceptance. One of the teacher's main functions in this connection is to locate the isolated child and employ ingenuity in getting that child into the social scheme of things. Perhaps the child can be assisted in developing prestige-giving skills.

At adolescence there are additional problems of social development precipitated by different rates of physical growth and isolation of the more immature. The attitude of the home is often obstructive with reference to development of an adequate attitude toward the opposite sex. Finally, the school may provide opportunities for social experience in its numerous extracurricular activities. These, after all, constitute an important preparation for subsequent life in society.

6

LEARNING FROM THE STANDPOINT OF THE EDUCATIONAL SYSTEM

Traditional Principles of Learning

In the preceding chapters on the development of the individual, we presented material on the educational system and what we know of its effect on the individual's development. Now we shall consider the function of education in relation to learning. Many of the fundamental principles of learning have been discovered in experiments with animals. The ubiquitous white rat has contributed more to educational problems than many people realize. Experiments with such organisms are often crucial because they can be controlled better than experiments with humans. We know, for instance, that the rat spends the entire night preceding the experiment in his cage in the laboratory. We may remove a portion of his brain if we wish. Once we have established basic principles with animals, we may extend our theories to deal with humans. We can then continue our experiments, though less exactly, in schools and in industry.

Use. One of these basic principles of learning is so obvious that it scarcely needs mention. This is termed the "law of use" and simply means that if an act is repeated often enough there is considerable likelihood that it will become habitual. It is by this simple but important expedient that a great deal of the child's educational progress takes place. He repeats the multiplication table so many times that it becomes a permanent fixture. As he looks at a page of print, his eyes fixate one point, jump to another point, and so on, until after repeated exercise of this sort, he can read with reasonable facility. At higher levels, he repeats the formula for the binomial theorem a sufficient number of times so that it can be recalled when it is wanted.

It should be noted, however, that sheer repetition, in spite of its extensive use and honorable history, is not enough to insure learning. Efforts limited to pounding home desired facts fall far short of attaining the maximum objective. The subjects in an experiment were required to draw a four-inch line in one quick movement with their eyes closed. They did from 170 to 200 such lines per day for twelve days, but never saw the lines they drew. With upwards of 2,000 repetitions there was no improvement in the accuracy of their performance.[1] Obviously the mere repetition was insufficient. If the subjects had known how accurate their successive efforts were, the story might have been different. Practice, obviously, provides a chance for other factors to get in their licks, but of itself it is inadequate.

Another qualification should be made regarding this law of use, namely, the importance of repeating only the correct responses. If a person repeats mistakes, he is forming the habit of making those mistakes. If he looks at *A* on the copy and hits *Q* on the typewriter, he is forming an association between the visual stimulus *A* and the motor response *Q*. It doesn't take long to form this incorrect habit. If the child says that two times three equals seven a number of times, he will soon be giving the wrong answer every time.

This point was brought out in a study of learning to typewrite. The pupils were divided into two groups and practiced for about thirty-six days. One group was motivated to go rapidly; the other to be careful. After this initial period, four months elapsed with no practice at all, and then they took a test. The accuracy group at that time did about 17 per cent more than the speed group and made about half as many errors.

Disuse. Coordinate with the law of use and equally obvious is the "law of disuse." This means that if a connection between a stimulus and a response is not exercised, it gradually drops out. If the pupil hits *Q* instead of *A* on the typewriter but the mistake is immediately called to his attention, and he then hits *A* correctly for a number of times, the incorrect *Q* drops out because it has not been practiced. If a mistake in reading is corrected and not allowed to recur, that incorrect habit will soon disappear This principle emphasizes again that we should strive for accuracy rather than speed, particularly in the early stages of learning.

Law of effect. Another principle which comes out in experiments is that the effect following a response has something to do with the tendency of that response to be learned. In the laboratory the animal is given food after the correct response and an induction shock after the incorrect, and learning is facilitated. There is some scientific controversy on this particular point. It is not entirely clear, for example, how something happening after the correct or incorrect response works retroactively to strengthen that response. This is not the place to go into the details of the controversy. The consensus is that, however interpreted, this law of effect does operate and, empirically, reward and punishment, broadly construed, do facilitate learning.

---

[1] Thorndike, E L, *Human Learning*, pages 8 ff New York Appleton Century, 1931

Our present problem is the utilization of this law of effect in the school situation. Children whose educational performance is successful receive prizes, have their names starred on the board, are entered on an honor roll, or receive grades that symbolize good work. If the educational performance is poor, the student gets a low grade on the paper, is personally reprimanded, is kept after school in order to make up for some deficiency, or even is kept behind in the same grade when others are promoted. In the actual administration of reward and punishment anything in the way of a prize constitutes a greater source of satisfaction if other people know about it and it is awarded at a public occasion. Receiving a prize by mail is much less satisfying than receiving it on the platform in front of a crowd. Reprimands, on the other hand, are better administered in private. This does not mean that they are more severe, but a public reprimand introduces other factors—for instance, a hostile attitude toward the teacher which the other pupils may feel. An industrial foreman whose policy is to "give them Hell out loud so they all can hear," is not approved in his department, even though many of the men have never been on the receiving end of his reprimand.

Certain cautions should be mentioned in connection with this law of effect. Sometimes it is difficult to find any reward whatever for a dull pupil. The cards are simply stacked against him, and he never does anything well. The situation is improved somewhat if he is put into a homogeneous class with others of his kind so that now and then he may excel from a comparative standpoint. Being *relatively* good brings some satisfaction. Barring this possibility, it is desirable to find anything which he can do well, even cleaning erasers or running errands. If he can get a little success experience of some sort, it may help his morale. The mistake sometimes is made of requiring the pupil to do things that, at the moment, are beyond his level. This may bring about failure and discouragement, not because of his general incompetence but because of poor planning on the part of the teacher. Caution should be observed also in using the negative aspect of this law of effect too extensively. Although an occasional reprimand or correction of a mistake is perfectly in order, if it occurs too often, the youngster may become discouraged and simply give up.

A moot question is the comparative effectiveness of reward and punishment. Laboratory investigations have shown both to be effective, but it is difficult to measure the actual amount of either. It is impossible to say if a reward of three sunflower seeds after a fast of twenty-four hours is equal to the punishment of six milliamperes run through the wires on which the animal steps. Similarly, with humans it is not feasible to compare ten units of praise with ten units of blame because those units simply do not exist. The best that can be done is to administer praise and blame as they might be employed in a practical situation and ascertain if one is more effective than the other. One such experiment[2] was conducted with children in the fourth and sixth grades who were working on standard arithmetic exercises. They were divided into four groups and given tests. Three of these groups were in the same room together, but their treatment was different: the students in group 1 were called by name and praised for their performance on the first exercise; those in group 2 were called by name and reproved for their poor work; those in group 3 were not spoken to one way or the other. After this praise or blame had been administered, all three groups did some more standard exercises. The fourth or control group was in another room and knew nothing about the experiment. They merely took the same exercises at the outset and then, after the same lapse of time, took the second set of exercises. Group 1 did about twelve problems, on the average, at the outset and increased this to twenty after they had been praised. Group 2 went from twelve to sixteen. Groups 3 and 4 had practically no change. Thus, in this particular experiment, praise was more effective than blame. It is difficult to predict what would have happened if the children had been reproved much more vigorously or had even been punished physically before the second test. The conditions of the experiment, however, were similar to conditions likely to be found in an ordinary schoolroom.

Another bit of evidence may be gleaned from an experiment on learning code. In some cases whenever a person made mistakes, the experimenter said, "Wrong." In other cases, in addition to this verbal reproof, the subject received an electric shock or a small fine. Under these conditions the errors still continued to be about 10 to 12 per cent more than would be expected by accident, even when there were several shocks or when the fine (still very small) was quadrupled. On the other hand, when the experimenter said, "Right," after a correct response, those responses recurred some 27 to 28 per cent more than chance expectation.[3] Here again, rewarding the correct response seemed more important than punishing the incorrect. These experiments suggest that the teacher should count a little more heavily on praise than on blame in the school situation; and certainly, when a pupil is reproved for incorrect performance, he should know what *is* the correct performance. Rewards often yield ulterior values in the way of morale. The child who is commended by the teacher will come to like her better than if he is continually upbraided by her. The utilization of this principle in building morale is less significant in school than it is in some other learning situations, such as industry.

---

[2] Hurlock, E. B., "An Evaluation of Certain Incentives Used in School Work," *Journal of Educational Psychology,* 1925, 16, 145–159.

Readiness. Learning proceeds more effectively if the organism is ready for the particular experience. The white rat in the maze does not learn as rapidly if he is well fed and sleepy. He lies down and takes a nap instead of trying to find his way out. The school child who is sick or restless does not participate as readily in the learning situation. If his muscular development is insufficient to permit him to hold a pencil properly, he is not able to learn to write. A certain amount of maturity is necessary before the individual is ready to accomplish much in learning to read. It has been found, at higher levels, that students may often get little out of a literary appreciation course simply because they do not have adequate vocabulary to understand the material.

Motivation

Much of our life activity is pursued because of the drives or motives that urge us on, and the learning process in school is markedly furthered by adequate motivation. At the biological level, food, sex, getting away from dangerous objects, saving one's own life, and fighting off the opposition are things which brought our ancestors through the Stone Age with impunity. In the school situation we do not have so much of these motivations in their raw form but rather the modifications which have developed in our present culture. The basic tendency to preserve one's life, for example, takes the form of competition, striving for prestige, and interest in how one is progressing. We will now scrutinize some of these motivations.

Competition. Children will go to considerable lengths in order to be better than somebody else or excel in some type of activity. Competitive sports are the most obvious instance, but in the quieter aspects of school life competition is often utilized. It may take the form of individual competition or group competition. In an investigation of their comparative effectiveness, youngsters were given a substitution test in which they merely substituted symbols for numbers against a time limit. They were divided into three groups and, after an initial test, took a second one. The control group merely took the second test with no further instruction. Another group was divided into two teams of equal size, and the scores of the individual members of the team added together to constitute the team score. They were urged to do their best so that their team might beat the other team. In the third group, they were informed that everyone was for himself and scores of the second test would be announced in order to see who was the individual winner. The results were computed in terms of the amount of gain of the second test over the first. For the control group this amounted to thirty-seven points, which presumably reflects the effect of practice. With the team arrangement the improvement was only forty points—very little more than the control. With the individual competition, however, the improvement was fifty-seven points.[4] Individual competition obviously was more effective than group competition. This result appears at variance with situations like college football games in which there seems to be a tremendous amount of motivation in group competition. There is an important difference, however, between this situation and the experimental one. At the game there are other motivational variables such as the band, and the crowd cheering. In the laboratory or schoolroom it is a matter of sheer competition with no artificial outside variables. After all, individual competition harks back to a more basic, primitive level.

---

[3] Tuckman, J., "The Influence of Varying Amounts of Punishment on Mental Functions," *Teachers College Contributions to Education,* 1933, No. 590.

These conclusions were corroborated in another study of elementary pupils doing simple arithmetic problems. Some 1,500 pupils were involved. Each group worked for six successive periods on arithmetic tests under the two different competitive attitudes. Those who were working for themselves, that is, competing individually, started with an initial score of about 92 and this increased to about 95 in successive periods. Those who were working primarily for their group started at around 90 and went down to about 85 by the sixth unit.[5] This does not mean that group competition is necessarily ineffective in the educational situation. However, the group needs *esprit de corps* and some structure. The athletic team has a good deal of build-up before it goes into competition and perhaps even without a cheerleader and an audience it would work hard for alma mater. After all, competing groups need some spark-plugs if they are to be most effective. Another caution regarding competition is the discouragement that arises if a child loses all the time. Things should not be so arranged that a person is always competing with those who excel him.

---

[4] Sims, C. M., "The Relative Influence of Two Types of Motivation on Improvement," *Journal of Educational Psychology,* 1928, 19, 480–484.

[5] Maller, J. B., "Cooperation and Competition; an Experimental Study in Motivation," *Teachers College Contributions to Education,* No. 384, 1929.

Prestige constitutes an effective motivation in school work as in many other fields. This motive is easier to invoke for the younger school children who have not developed any spurious notion about the value of scholarship. At the high-school and, particularly, the college level, there sometimes develops an unfortunate attitude that high scholarship performance is not really commendable after all. *C* is a gentleman's grade. This notion arises partly from the fact that many students who are spending some of their time, and justifiably so, in outside activities find that their schoolwork suffers. Then, by a process of rationalization, they develop the idea that doing too well in schoolwork is not commendable. Some of this difficulty can be forestalled if, in the earlier years, the teacher can arouse intellectual enthusiasm to such a degree that it will persist throughout the educational program. One way to achieve this is through the actual enthusiasm of the teacher. The writer knows a secondary school mathematics teacher who has genuinely inspired numerous students in his classes simply because of his almost pathological enthusiasm for mathematics.

Knowledge of progress. There is usually strong interest on the part of persons performing a task in their progress record. When a psychometrist gives tests to people, practically everyone inquires "How did I do?" A basketball player would be annoyed if he shot for the basket and the lights were turned out before the ball landed, so that he never knew the result. In the school system this knowledge of progress can be capitalized on in such obvious ways as handing back the papers with grades on them. If the work lends itself to quantitative treatment, a graphic record of progress is helpful. The pupil can plot a curve showing his daily score and if, furthermore, he knows what is par—what persons of his type should be doing at that stage of learning—scrutiny of his chart will provide effective motivation. Some programs of self-instruction described earlier (page 81) utilized this principle by providing a series of arithmetic tests which the children could give themselves and a chart on which they kept a graphic record of their progress. Another feature of such a project is that, in addition to providing motivation, it helps the individual diagnose and correct his mistakes. A self-instructional program, by the use of appropriate keys, can indicate to the individual where he is making his errors. Such a program has been implemented by a compact little machine, involving, say, four keys which may be pressed according to four alternative answers to problems. The student is provided with a list of questions or problems, each of which has four alternative answers, and if he thinks that number two is the correct answer for the first problem, he presses the key marked 2. The mechanism contains a master strip on a revolving drum something like the record on a player piano, and an arrangement so that small lugs drop through holes in this strip and control a ratchet stepping mechanism. The master strip on the inside of the machine has been punched in advance to correspond to the particular series of questions that is being used. The machine works so that if alternative answer number two is correct, the machine will step along, ready for the next question and the student knows that he answered correctly. If his response is wrong, the machine jams and the pupil knows that he gave the wrong answer and will have to try other alternatives until he gets the correct answer, and the drum moves along for the next question. In this way, he can check himself question by question.

There are experimental indications of the effectiveness of knowledge of progress. One group of fourth-grade arithmetic students proceeded in conventional fashion, and a parallel group had both individual and class progress charts kept up-to-date throughout their program. Both groups made about the same initial scores, but the experimental group gained distinctly as time went on.[6]

Interest is an obvious source of motivation. The relation between attention and interest is well established. A person reads the parts of the newspaper which appeal to his particular interest. By the same token, if pupils can be interested in their schoolwork, they will devote greater effort to it. A useful way to stimulate interest is to provide a provocative environment. The school situation can be furnished with specimens, tools, pictures, phonograph records, small gardens, aquaria, or hothouses, which will intrigue the youngsters. Natural curiosity will frequently lead the children to investigate these items, and the transition to an interest in related subjects will not be difficult. If the school work can be related to everyday life, so much the better. This is frequently termed making the work "functional." Rather than studying mathematics in complete isolation and abstraction, the pupils can be given arithmetic problems that deal with dimensions of everyday things such as the schoolroom or the school grounds. The science class may lay off on a small scale the distances to the moon, sun, and planets, starting in the school yard and extending as far out into the countryside as is necessary. A geometry class worked with "the nature of proof," instead of going through the usual rote repetition of theorems. Every teacher has observed individual instances of the profound motivation sometimes accompanying a newly awakened interest. A boy dawdles through high-school science for months, and then suddenly starts building a radio set. In the short intensive period when he is working on the set, he acquires more scientific information than in the whole preceding year. A student working up material for a debate will, in a short period, do more reading than in a term's work in history.

---

[6] Paulasigui, I. and Knight, F. N., "The Effect of Awareness of Success or Failure," 29th *Year Book*, National Society for the Study of Education, 1930, pages 611–626.

Altruism. In the later secondary school years, there are occasional possibities of altruistic motivation. The adolescent often has considerable zeal for reforming the world, particularly in the social sphere. The adult realizes how slow that process must be, and his level of aspiration is not so high, whereas the student will go into those things head over heels. It may be possible, then, for the social science teachers to capitalize on this particular tendency and to start the pupils on some projects for the good of the community, where they can incidentally learn a lot about social science.

General effectiveness of motivation. It is well to note instances showing the effectiveness of motivation under extreme conditions. A person may be sick, but the house catches fire and he gets out. The case has been mentioned of persons who had a neural pathway to some muscle group injured so that it was necessary for another pathway to take over the function of supplying that muscle. In such cases extreme motivation was necessary in order to break through the new pathway. A mechanical device was used to inform the person of his progress—a device which amplified his most minute motions, and spurred him on to greater efforts. One investigation which checked on this general problem follows. Some fraternity pledges had been through "hell week" and on the last night of the period, as is customary, they were in pretty bad shape from the standpoint of fatigue. Then, ostensibly as a part of the actual investigation, they were put through a lot of standard arithmetic tests. It is to be noted that it was late at night, and they were in a badly fatigued condition, but they took the tests under conditions of high motivation because the rest of the group stood over them. Their scores in a period of something like two hours were recorded carefully and compared with other scores in the same tests. It developed that these freshmen, in spite of extreme fatigue and sleeplessness, were able to do the task more effectively than upperclassmen who took those same tests on a morning in the middle of the week when they were fresh and in good condition. In actual scores the upperclassmen averaged about 11.5 columns of figures per five-minute interval, whereas the freshmen with the extreme motivation averaged 21.9.[7]

Results are much less dramatic with moderate amounts of motivation, but even then a distinct correlation is found between the degree of motivation and the amount of performance. For example, children who were tossing balls into a hole or learning simple codes were rewarded for their success by .1, .2, .4, or .8 cents. An entire series with the .8 cent reward showed no appreciable difference from one where the reward was .1 cent. If, however, the reward was changed during the series itself, then the increased reward produced increased efficiency.[8] In another study children taking mental tests were given a new rate of reward every time they broke a previous record. Under these conditions their performance kept improving constantly throughout a ten-week period.[9] This type of sliding scale, however, would not be very feasible under ordinary school circumstances.

Further Principles of Learning

Learning by doing is essential. When one is attempting to teach a cat to operate a latch to open a door, the process is not facilitated very much if one takes the cat's paw and pushes it against the latch. In this passive performance the cat merely receives sensations of pressure from the paw on the latch. If the cat does the act itself, it also has the impulse going along the efferent neurons to the muscle. Forming the habit involves lowering the resistance along that entire arc. Passive instruction merely touches the end of the process and does not form any of the intermediate connections. Similarly, guiding a child's hand through the motions of writing is not the final answer because, there again, the entire neural pathway is not involved. This is one reason for the desirability of recitation on the part of the student as contrasted with mere drinking in. The following experiment revealed the approximate order of magnitude of the improvement due to recitation. Students learned nonsense syllables under varying conditions, always, of course, devoting the same amount of time to the learning. In some series they spent all the time merely reading the syllables, in other series they spent 20, 46, or 80 per cent of the time reciting. Recall was checked four hours after the initial learning. For the 100 per cent reading series, about 15 per cent of the material was recalled. With increasing amounts of recitation, this per cent increased until with 80 per cent of the period devoted to recitation, 48 per cent of the material was recalled. Similar though less striking results were obtained when the students were learning sense material. When all the time was spent in reading, the score was 16 per cent, and when 80 per cent of the time was spent in recitation, the score was 26 per cent.[10] The teacher should be cautioned, however, against overdoing this active participation to the extent of assigning a lot of busy work. After all, the recitation and the active learning should involve worth-while aspects of the material.

---

[7] Knight, F. B. and Remmers, H. H., "The Fluctuation in Mental Production When Motivation is the Main Variable," *Journal of Applied Psychology,* 1923, 7, 209–223.

[8] Thorndike, E. L. and Forlano, G., "The Influence of Increase and Decrease of Amount of Reward upon Rate of Learning," *Journal of Educational Psychology,* 1933, 24, 401–411.

[9] Flugel, J. C., "Practice, Fatigue and Oscillation," *British Journal of Psychology,* Monograph Supplement, 1928, No. 13.

Recent experiments indicate that under certain circumstances something may be gained by "guidance" of the learner. White rats were required to discriminate between certain shapes on two targets in front of them and to jump through the air at the correct one. If they were successful, they went right through the paper target and secured food, but if they chose the wrong target, they bumped their noses and fell into a net. The rat often paused and looked at the targets before jumping, and guidance was introduced by putting one hand in front of the rat when he was orientated toward the wrong target or by pushing him slightly toward the correct target. This procedure was more effective in breaking an old habit than in forming a new one. No experiments have been conducted as yet to check this particular point with reference to school materials.[11] The question should remain open for the present.

Context. Learning is more effective if it is in context. Traditional methods taught the spelling of words in complete isolation, or taught grammatical rules merely as rules without relation to actual sentences. An extreme case was found of children near the end of the first grade who could not write their own names. The teacher had insisted that they learn all the small letters and then all the capitals before attempting to write their names. At the moment, they had completed the small letters and were only part-way through the capitals. The motivational value of writing one's own name was completely lost. Those familiar arithmetic problems about one train going at a certain rate and overtaking another train would be meaningful to train dispatchers but not interesting to the average pupil. Experiments show the value of learning grammar and spelling in context. Children were trained in repeating grammatical forms in actual sentences fifteen minutes a day for three weeks and made as much progress in correct usage as is generally made in three years of teaching them rules.[12] In this connection it is well to remember that the youngsters have a life outside school. If their school material can be related to this outside life, and they can bring in problems from outside, so much the better.

---

[10] Gates, A. I., *Psychology for Students of Education*, page 270. New York: Macmillan, 1924.

[11] Maier, N. R. F., and Klee, J. B., "Guidance *versus* Trial and Error in the Alteration of Habits and Fixations," *Journal of Psychology*, 1945, 19, 133–163.

Partial activity. The learner may profitably devote his attention to certain portions of the learning situation rather than to the entire situation. This is termed "partial activity." The animal escaping from a problem box will gradually limit its attention and effort to one part of the box. In school the child can have his attention directed to certain specific difficulties on which he can work more intensively. This procedure may be facilitated by research to determine the common difficulties in a subject. An investigation of difficulties in English composition is a case in point. A sample of compositions written by pupils from the seventh to the twelfth grades was analyzed in detail, and the frequency of mistakes of different types noted. Difficulties in capitalization at the beginning of a sentence occurred with appreciable frequency in all the grades investigated, averaging 27 mistakes per 10,000 words. This result was largely due to conventional sentence structure whereby every sentence begins with a capital. There was comparatively little difficulty with the names of persons or with capitalizing the first personal pronoun. In the seventh and eighth grades there were many mistakes with capitals at the beginning of a quotation, and with the capitalization of titles of books or articles, but this difficulty disappeared in the later grades.[13] Studies like this tell the teacher where to direct partial activity.

Of equal importance is the diagnosis of special difficulties of the individual student with a view to his concentration on those difficulties. A college freshman received poor grades on all her English themes and the marginal comments were "poorly expressed," "poor sentence structure," "awkward," "incoherent." The poor child was quite bewildered and thought she was making hundreds of different kinds of errors. When her themes were scrutinized by an expert, it developed that two thirds of the mistakes were due to vagueness in pronoun reference and most of the remaining difficulties were due to her failure to put corresponding ideas into corresponding construction. Her attention was then directed to these two difficulties. She went over some of her old compositions with those things in mind, worked on sample exercises to bring out distinctions, and finally eliminated about 90 per cent of her mistakes.[14] In another case students of arithmetic received individual attention over a six-week period in which their errors were diagnosed carefully. They devoted partial activity to correcting those errors, but spent only the usual amount of class time in this work. In the six weeks, however, they gained as much as is ordinarily gained in one and one-half to two and one-half years by students in the same school pursuing the normal program.[15]

---

[12] Symonds, P. M., "Practice *versus* Grammar in the Direct Learning of Correct English Usage," *Journal of Educational Psychology,* 1931, 22, 81–95.

[13] Pressey, S. L., "A Statistical Study of Usage and of Children's Errors in Capitalization," *English Journal,* 1924, 13, 727–732.

Retroactive inhibition. Some aspects of the actual organization of the learning program are pertinent. Much depends upon what happens immediately after a period of learning. A person who is knocked unconscious may have amnesia for events just preceding the accident. The details did not have a chance to settle down and get integrated, as it were. Experiments in learning lists of words, some series followed by a short period of doing mental arithmetic, and others by a similar period of doing nothing, reveal better retention in the latter case. Thus, too rapid a transition from one school subject to another proves undesirable, for the second may interfere with the retention of the first.

Distribution of repetitions is another problem in organization of learning. This takes advantage of the principle just mentioned and allows the material to settle and become integrated between repetitions. In a simple investigation subjects read a technical passage five times. Some of them did the five readings in immediate succession, and the others distributed them over a longer period. The distributed group did 4 per cent better in immediate recall, 20 per cent better in recall two weeks later, and were 25 per cent superior after four weeks.[16] The ordinary school system does a lot of this distribution. Usually a given subject is discussed only once a day, and there often is a break between subjects, particularly in the secondary schools where pupils go from one room to another to participate in different subjects.

Whole *versus* part learning. A somewhat related point is the frequent desirability of learning material in rather large units instead of piecemeal. If a poem is learned one line at a time, it is necessary to go back and give additional repetitions in order to connect the lines together. If the entire poem had been read the number of times required to fix each individual line, the connections between the lines would have been formed incidentally without additional repetitions. In one investigation with a twenty-line poem, there was a saving of about two minutes by using the whole method, and on a poem of 120 lines, the saving was about twenty-nine minutes. The comparative effectiveness of the whole and part methods of learning varies somewhat with developmental level. For children in the lower school grades the whole method was most effective for simple poems, and with pupils in the higher grades it was most efficient with the more difficult poems.[17]

---

[14] Pressey, S. L. and Robinson, F. P., *Psychology and the New Education,* page 460. New York: Harper's, 1944.

[15] Brownell, W. A., "Remedial Cases in Arithmetic," *Journal of Education,* 1927, 7, 100–107.

[16] McAustin, S. D., "A Study in Logical Memory," *American Journal of Psychology,* 1921, 32, 370–403.

This method can be carried too far, however, because there is the danger of possible discouragement when there is a large amount of material. The subject may be at the point where he almost has it and, with a few more repetitions, will be able to reproduce the entire selection. At the moment, however, he does not realize this and actually cannot recite a word. With a long assignment it may be desirable to skim the poem in entirety a few times to get the general connections and then take it in smaller units. There is no point, however, in learning the material in a given order unless it is going to be used in that order. There is no advantage, from a long-time point of view, in learning 2 x 3, then 2 x 4, then 2 x 5, because in actual practice those combinations seldom are used in that particular order.

The intention with which a person approaches a learning situation makes some difference in his effectiveness. If subjects go through certain material with the idea of remembering it for a few minutes or remembering it for several days, they do better in the latter case, although all the other aspects are constant. As an everyday instance, few people can tell which shoe they put on first in the morning because they never put them on with the idea of remembering that particular sequence. Similarly, many persons cannot tell whether the six on the face of their watch is an arabic or a roman numeral, because they have looked at the watch to tell time and not to remember the type of numerals. A group of children copied words from the blackboard. Another group copied the same words but were told to remember them. The same amount of time was devoted to the copying in both instances. The group with the intent to remember did about 30 per cent better on immediate recall, and about 50 per cent better on delayed recall. This trend suggests that effort should be made to have the students want to remember the material. This often can be accomplished by showing its ultimate utility.

---

[17] Northway, M. L., "Difficulty of the Task and the Ability of the Subject as Factors in Whole-Part Learning," M.A. Thesis, University of Toronto, 1934.

Overlearning has a marked effect on retention. After we have barely learned something, we begin to forget it fairly rapidly, but if we have more than barely learned it, that is, have given more repetitions than necessary for immediate recall, it persists more effectively. That is why the multiplication table is retained for a lifetime. Some discretion should be used, however, in the exercise of this principle. The easy parts should not be overlearned too much, but more effort should be concentrated on the difficult portions.

Checking the Results of Learning

Written quiz or essay examinations. In a learning situation the teacher should know how things are progressing. The old stand-by is the written quiz or, in modern parlance, the essay examination. It may range from computation to discursive treatment of a topic. In addition to ascertaining what the student knows, it may reveal something regarding his ability to think, or to organize material, or even to express himself. The teacher may also note difficulties in logic or organization with a view to constructive suggestions along these lines. A disadvantage of this technique is that it is possible to give only a very few questions on an examination, and this introduces a sampling error. In a particular course of study there may have been 5,000 items of information, but the examination touches only 10 of them. It is a question whether these 10 are an adequate sample of the 5,000. The pupil might know 99 per cent of the items in the course and be given exam questions drawn from the other one per cent. Another disadvantage is that the evaluation of an essay examination may involve variables other than the actual competence of the pupil. A teacher may be influenced by general impression or by mere legibility. Her favorable (or unfavorable) impression of one question may carry over to another question. This is the familiar halo effect encountered in many other situations—such as judging personality traits. A rater may get an unfavorable impression of someone's appearance, and then rate him low in intelligence, cooperation, and industry. Similarly, if the student makes a mess of the first question on an essay exam, the teacher may think that the other questions are poorly written also. This error may be minimized if the teacher grades the first question on all the papers, then goes on to the second question, and so on.

It is easy to demonstrate the unreliability of the essay type of examination by having different people grade the same papers. A paper in geometry was sent to 116 teachers with the request that they grade it on a percentage basis as though it were written by one of their own students. The grades ranged from 28 to 91. A final examination in high-school English was graded from 50 to 95 by a hundred English teachers, and an examination in American History received grades from 42 to 90.[18]

The oral examination may be mentioned in passing although it is little used below the college level. It has some merit in giving the student experience in thinking on his feet. It is also flexible and makes it possible to follow up various leads. Considerable ground may be covered in an oral exam so as to secure a more adequate sample of what a student knows. The evaluation, however, is very much qualitative, and the student's actual manner of presentation and the halo effect may influence the results.

Objective examinations prepared by the teacher. In recent years there has been a trend toward objective examinations prepared by the teacher. In form these follow essentially the group intelligence tests mentioned earlier (page 71). The most common type has a statement with several alternative answers, only one of which is correct, and the pupil marks the correct one. A typical item in a geography exam might be:

The capital of Ohio is: Dayton, Cincinnati, Columbus, Cleveland.

Frequently the alternatives are limited to two and the pupil checks merely to indicate whether the statement is true or false, for example:

The capital of Ohio is Cincinnati. True______False______

In this latter instance, however, it is necessary to make allowance for the possibility of guessing the correct answer. If a student knew nothing whatever about the material and marked the true-false answers at random, he would be more apt to get 50 per cent right than to make any other score. Obviously, it would be unfair to give him 50 per cent credit when he deserved none. The usual procedure is to score the examination in terms of the number of correct answers minus the number incorrect. If there were a hundred items, and the student knew none of them, he would get about 50 right and 50 wrong and would be scored 50 minus 50 or zero. If, on the other hand, he actually knew 80 items, and thus deserved a score of 80, he would mark those 80 correctly, guess at the other 20 and get about 10 of them right, so that his total score would be 90 right minus 10 wrong which gives the 80 which he deserved. Strictly speaking, chance success is seldom exactly 50 per cent, but greater statistical refinement is not warranted. It is somewhat better practice to use more alternatives and minimize accidental success. With four or more alternatives, correction for the chance element seldom is made.

---

[18] For further instances, see Hartog, P. and Rhodes, E. C., *An Examination of Examinations.* London: Macmillan, 1935.

Another type of objective test uses a completion technique. This involves sentences or consecutive material with occasional words omitted and the student supplies the missing word. A response may be difficult to score objectively if there are several possible words that might be supplied with varying degrees of appropriateness. Another procedure is a matching technique. For example, given the names of four poems and the names of four or more authors in a random order, the student is required to indicate which author goes with which poem.

The main advantages of the objective examination are its unequivocal character and the ease of scoring. There is no doubt about the correctness of an answer, and a clerical worker can score it just as well as the teacher. Procedures were discussed earlier (page 72) for facilitating the scoring of group intelligence tests by means of stencils, special answer pads, pre-scoring devices, and even electrical machines. Such procedures are directly applicable to the objective examinations prepared by the teacher. Another advantage is the reduction of the sampling error because of the much larger number of items included. In some objective examinations the student may do several items per minute.

Some objections are raised against this type of examination, however. For one thing, it is claimed that a false statement in the true-false examination may teach the pupils the incorrect answers. However, the student usually gets the paper back and can determine why the wrong answers are wrong. Another objection is that the test is artificial and compels the student to make a categorical answer. As a matter of fact, a great many life situations are of just that sort. We very frequently have to give an outright yes or no judgment. In daily life we would seldom be asked, "Name five of the main causes of the Civil War." We are apt to have to evaluate some specific cause. Still another objection is the claim that the objective examination gives no indication of whether the student can organize the materials he has been studying or can do original thinking in that context. This is true to some extent, but there are many situations in which the teacher is concerned primarily with the information which the student has acquired, and here, of course, the objective examination is adequate.

It is possible by the exercise of some ingenuity to devise items which do require interpretation in the process of selecting the correct answer. Two illustrations will be cited from examinations in psychology courses. In a course dealing with the psychology of the elementary school child a brief case study is presented including the following: "Richard is 8 years old; he is in the third grade; his mother belongs to the Association of University Women; his father is a librarian; both parents are interested in having him read better; he tells the pupils at lunch about the Burgess stories his parents have read to him; he brought his rock collection to school and then some of the other children brought in rocks for him; his number work is good; he does not study much but looks around the room; in the second grade he spent most of his time on the playground with another boy who moved away recently; he is in the slow group in spelling." Other information comprises scores in certain intelligence tests and reading tests and a graph showing Richard's physical growth. (The actual case report is more extensive than the above.) Then the students taking the exam are required to check whether Richard's adjustment is satisfactory or whether he needs treatment in: relation to playmates; relation to school work; relation to parents; and so forth. Next, the students, using the same data, are required to check certain factors which might have contributed to Richard's status, such factors as: Richard probably inherited mental instability; his rate of physiological development is different from ordinary; his parents completely dominate the boy; he has poor work habits. Finally the students check alternatives to indicate how to secure further information that would help in handling Richard's case, alternatives such as: find out which eye is dominant; look up scores in the reading-readiness test given in the first grade; interview the parents; consult the school nurses about health; have the reading clinic make a complete diagnosis.

The actual examination is much more detailed than the above. It is objective in the sense that the student merely makes a few dozen check marks at appropriate places on the sheets but, nevertheless, has, in the process, drawn scientific conclusions from data in the light of principles taught in the course and has used these principles in interpreting the case and recommending steps to be taken.

Another type of examination question deals with interpretations of experimental data. A typical one indicates that white rats had been studied in a situation where they had to cross a grill and take an electric shock in order to satisfy the drives of reaching food, water, a rat of the opposite sex, a litter in the case of a mother rat, or merely to explore. The experiment yielded the following data as to the number of grid crossings under the drive indicated:

Males		*Females*	
Thirst	21.1	Maternal	22.4
Hunger	19.1	Thirst	19.7
Sex	13.5	Hunger	19.0
Exploratory	6.0	Sex	14.1

The students are required on the basis of the above data to indicate whether statements like the following are true, probably true, doubtful, probably false, or false:

1. The maternal drive is the most intense of all those tested.
2. We may conclude that human drives operate at about the same average intensity.
3. The sex drive is stronger in males than in females.
4. Crossing a grid to a goal is a good way to measure drives.
5. The difference of 0.7 between hunger and thirst for females does not mean anything.

Here again the students taking the examination merely check a few statements but do much more than recall bits of information received in the course. Procedures like the above may be extended to a variety of academic subjects.

Standard Achievement Tests

The procedure just discussed has been extended by having the teachers collect numerous examination items of the objective type over a period of years. They keep records as to the difficulty of each item in terms of the percentage of students who passed it. With this information, it has been possible to assemble what is essentially a standard test in that particular subject. This is exactly the procedure that has been followed by some researchers in developing standardized achievement tests and norms.

Research in test construction. It should be emphasized that good tests of this sort do presuppose some research as to item difficulty. If an achievement test for a certain grade in geography is devised, and the questions are too easy, it is useless as a diagnostic instrument in that particular grade. Moreover, there are fine points of test construction involved in this preliminary research. For example, in the alternative-answer type of test we need to know something about the difficulty of the misleads or the alternatives which are incorrect. A formulation like the following would be silly: The capital of Ohio is: Dayton, Columbus, Cincinnati, Lake Ontario. No one would be misled by the Lake Ontario alternative, and it might as well have been omitted. If three of the alternatives happened to be that absurd, anyone could guess the correct answer. Preliminary research will indicate the difficulty of each mislead in terms of the per cent of people who mark it. Each one should be selected occasionally, but should not be so equivocal that it is selected, say, 25 per cent of the time.

Form of test items. The form of these standard achievement tests is identical with the form of those discussed in the preceding section on objective examinations prepared by the teacher. They may be true-false, multiple-choice, matching, or completion. The multiple-choice form is the most widely used. Good tests which have been published were developed through preliminary research, and norms or standards are based on a considerable number of children. Tests of this sort now are available in most of the conventional school subjects. At a rough estimate, 1,500 different standard achievement tests have been published in recent years.

Uses of achievement tests. These tests may be put to much the same use as the teacher's own objective tests but are of a little wider applicability because of standardization on large samples and availability of norms. For one thing, it may be feasible to survey the subject as a whole on a rather broad basis. If the teacher is beginning to work with a new group of pupils in arithmetic, she may give a standard comprehensive test, find out what the students already know, and govern her procedure in the light of these findings. The tests may serve as a check on rate of progress, too. In a large school system the superintendent may find it desirable to have some standard tests given throughout the entire system. If discrepancies are found in the results from different schools, the causes of those discrepancies will bear investigation. They might be caused by the pupils or the teachers. If the achievement tests are supplemented with intelligence tests, it may be possible to get information about the efficiency of instruction. As indicated previously, a high correlation should exist between intelligence and school performance, and if the correlation is low, it may reflect on the competency of the teacher. Another use of achievement tests is for diagnosis of the individual pupil's difficulties. In arithmetic the tests might involve adding, subtracting, or carrying numbers from one column to another. Once the particular difficulty has been located, special attention can be given to it, utilizing the principle of partial activity.

Advantages. The advantages of the tests are implicit in some of the foregoing. They provide reliable norms based on large numbers, and a child can be compared with the norms just as we compare his height and weight with the standards for his age. The time-saving feature is another aspect and more pertinent here than in the case of the teacher's own objective tests because she does not have to spend time constructing them. The only appreciable disadvantage is that, like the teacher's own objective tests, they do not measure actual thinking ability. However, as suggested above (p. 132) it is possible, by ingenious construction of items, to introduce some questions requiring thought and interpretation.

Graphic Representation of Course of Learning

Plotting learning curves. When tests are given periodically as a means of checking on progress, it is helpful to plot the results graphically. The procedure of plotting a learning curve is straightforward. On the horizontal axis (abscissa) is a time scale, that is, the successive periods of learning, such as days or weeks, and on the vertical axis (ordinate) is plotted the efficiency. This latter may be in terms of number of test items correct or it may be in terms of errors made in some function such as punctuation.

Trend of a function through the school grades. One type of learning curve shows the development of a function throughout the school grades. The abscissa represents first grade, second grade, third grade, and so forth, and the ordinate gives the average performance of first graders, second graders, and so on in some particular school subject or detail of that subject. The resulting curve shows the trend of the function through the school years. It would be possible to secure data for such a curve by following the individual child through twelve years of school, but the results of the investigation would not be available until the end of that period. The next best thing is to plot performance of the average child at each grade and assume that if we had followed a group of children through the long period, we would have had essentially the same kind of curve. A few such curves are presented in Figure 4. They show the decrease in errors in several aspects of English composition from the third grade to college. The general decrease is obvious, but it appears that most of the progress is made by the end of the eighth grade. The slight upswing in the punctuation curve is a bit disquieting, and suggests that in the later school grades and in college, education goes in reverse. The fact that the curves level off after the eighth grade raises a question as to the advisability of teaching English composition beyond that point. Such curves have obvious utility in showing where most learning of a particular function takes place in the school years. The curves will indicate also whether the learning starts before the pupils are ready for it. A certain degree of maturation is necessary before the organism can profit by tuition of a given sort. This point was illustrated earlier with tadpoles (page 20). Similarly, the vocabulary of young children shows a curve that is almost level for a period, and then begins to shoot up. They are not ready for words until the time the curve indicates.

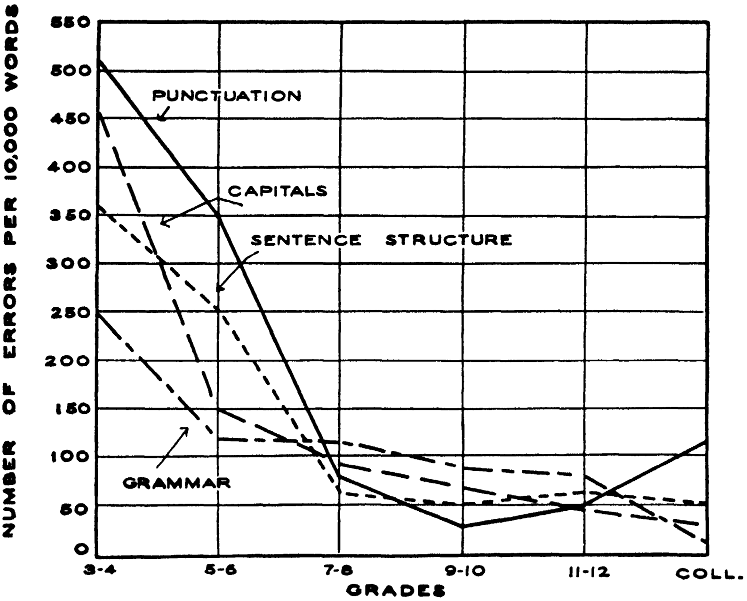


Figure 4. Learning Curves for English Composition.

Individual learning curves. Of more interest in many educational situations are the learning curves for a specific child. They are plotted in essentially the same fashion as the foregoing except that the abscissa involves much shorter intervals such as successive days or weeks of practice, and the ordinate gives the scores of the individual child at the corresponding stages of practice. Two such curves appear in Figure 5. The one for the boy learning simple multiplication shows a rapid rise through the first dozen practice periods, then a leveling off and a little tendency to rise again toward the end. Somewhat the same trend is shown in the typewriting curve. If it is desired to abstract from the daily fluctuations and get the general trend, it is possible to smooth the curve statistically. Superimposed in Figure 5 are the smoothed curves. Individual curves of this sort enable the teacher to follow the pupil's progress, and it may be illuminating for the pupil to see his own progress. Moreover, if most individuals show almost the same kind of curve, the teacher knows what to expect from the new pupil.

Characteristics of individual learning curves. Although individual learning curves show considerable variation from one person to another, they have certain common features. One of these is the rapid initial rise. When a learner starts from scratch, the acquisition of a very few new associations makes a comparatively large improvement. For example, when one is learning to typewrite, at the very outset it is a matter of thinking of a letter, looking over the entire keyboard to find that letter,

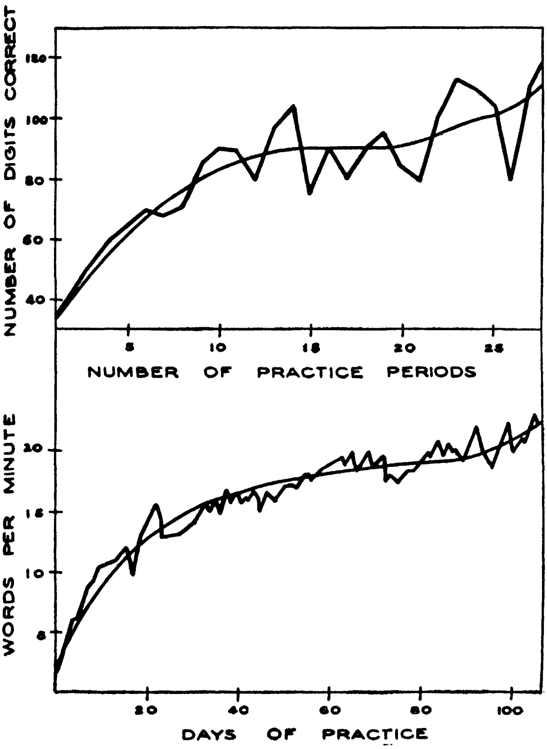


Figure 5. Practice Curves. Multiplication (above); Typewriting (below).

hitting that key, then hunting all over the board for the next letter, and so on. After a small amount of practice, one knows the location of some common letters, such as *E* and *A*, and eliminating the search for those few letters makes a comparatively large improvement in speed of typing. After the keyboard is mastered, improvement consists largely of clipping a few thousandths of a second from each response, and progress is relatively slow, hence the negative acceleration apparent in the learning curve. Another thing that sometimes makes for this rapid initial rise is the enthusiasm with which a learner undertakes a novel task. Occasionally, there may be transfer of skills from some other function. A person with a lot of experience in throwing a ball, might make good initial progress in learning a new game which involves throwing. If, on the other hand, the learning curve does not show this rapid initial rise, it may reflect the fact that the pupil is not ready. A pupil who is learning to write before his musculature is sufficiently developed will not have the conventional learning curve.

The typical learning curve shows negative acceleration, but this is not universally the case. There are occasional functions in which the curve starts with a positive acceleration, then goes through a point of inflection, and follows the usual negative acceleration thereafter. Acquisition of vocabulary by a very young child shows this trend. It is also found with young children working at a game of ringtoss. One explanation that has been suggested is that in these cases the children were starting absolutely from scratch whereas, with some of the other functions, such as typing, there may have been some related skills which were present so that the data did not represent the actual beginning of the learning curve.

Another characteristic of the learning curve is its fluctuating character from day to day. These fluctuations may be due to such causes as slight illness, loss of sleep, distraction, or worry. The learner is liable to become discouraged when a little slump occurs. If the teacher explains that these daily ups and downs are to be expected, she may forestall this discouragement. Occasionally, a learning curve shows a sharp improvement, because of insight. The subject suddenly sees through some particular point that has been holding him back. Even chimpanzees working on problems will be making about nine mistakes out of ten and then suddenly make only one out of ten. This trend also may occur in acts of skill. A golf player reaches the stage where suddenly his stroke clicks. A child reading word for word suddenly becomes interested in the story and involuntarily speeds up. If we do find these sharp rises in a learning curve and can discover their causes, it may be possible to utilize the information and try to make such causes more generally effective.

Learning curves ultimately level off and approach a limit. In motor performance this limit is set by the musculature. In the intellectual sphere there are similar limits although the mechanism is not as clear. If there is a real limit to a particular function, it is a mistake to urge the person to exceed that limit, because unnecessary discouragement will result.

A plateau is found in some learning curves. There is the usual leveling off, apparently as though the curve had reached the top, but after a considerable period it goes up again to its ultimate limit. There are indications of such a plateau in the two curves of Figure 5. In some functions, such as typewriting, they occur at almost the same point for most learners. Some persons are inclined to give up practice at this point, but the teacher may be able to get them over the plateau or at least keep up their interest until they get over it anyway. One factor contributing to the plateau is the transition from lower to higher order habits. For instance, typewriting involves, at first, typing letter by letter, but with time, the method changes to reacting to whole words without thinking of the individual letters. There are indications that the lower type of habit must become pretty thoroughly automatized before one is ready to employ the higher order, and the plateau is a period for this automatization. In writing, such things as developing a new habit of holding the pencil might mark the end of a plateau. In reading, there are developments in the eye movements involved. Photographs show, for example, that there are many more eye movements in oral than in silent reading. Evidently, oral reading proceeds word by word, whereas in the silent method the material is grasped in larger units. The transition from looking at each word to grasping phrases may involve a plateau. Occasionally a plateau is due to the interference of some undesired habit, such as counting on the fingers when doing arithmetic.

Another factor involved in the plateau is motivation. The student realizes that he is not making much progress, gets discouraged, and tries to remedy the matter by forcing himself. Then he is likely to break, so that he has to slow down and start over, as it were. Adequate motivation at this point obviates some of these difficulties. There have been instances in which a wise teacher who was expecting a plateau was able to forestall it by additional motivation. Plateaus seldom occur in learning curves for animals. The animal usually is motivated—he is hungry and does not eat until he achieves a certain performance, and if he makes a false move, he gets an electric shock. It has been suggested that if the typewriting class met before breakfast, remained unfed until they had reached a certain level of performance, and sat in chairs which were wired with electric grills to give them induction shocks for mistakes, plateaus might be minimized. At any rate, the plateau is a time when the teacher's help is needed.

Equation of learning curve. There are intriguing possibilities of deriving the mathematical equation of learning curves. The actual technique is beyond the scope of the present discussion, but it is possible to secure data on many learning curves and then try to fit some mathematical function to them. If the equation of the learning curve for a particular task was known, it would be possible to take the data for a given individual, substitute his scores in the equation, and then extrapolate. To take an absurd example, if it developed that the learning curve was a straight line, a person could perform the task twice on successive days, and from those two scores it would be possible to draw the entire curve and tell what he would be doing a year hence. For many kinds of curve three points would be adequate for plotting the entire curve, once the general equation was known. Some research has been done upon this problem, but the ultimate solution has not been attained. One difficulty is the determination of the actual beginning of the curve, that is, the zero ordinate. Theoretically, the curve should start from the very beginning of the learning, but in many learning situations this is not the case. In typewriting, for example, the learner may have had certain other experiences in fine coordination, like playing a piano and reading and perceiving words, which are part of the job of learning to typewrite, so it is difficult to go back to the very beginning of that learning function. At any rate, this is a point for interesting speculation and further research. Ultimately it might be of tremendous consequence for school people in predicting the limit which the individual pupil might hope to attain in any particular act of skill or even in some academic subjects.

Curve of Forgetting

One other kind of curve is of interest in the present connection, the curve of forgetting. The subject is required to recall the material at various lengths of time after the initial learning. These time intervals are plotted on the abscissa, and the amount retained on the ordinate. A few typical examples are shown in Figure 6. One curve is for learning nonsense syllables, another for retaining material in a passage read, and the third for learning material in college zoology. The general trend is obvious with a rather abrupt drop in the curve at the outset followed by a gradual leveling off. The more abrupt drop in the case of the nonsense syllables is due to the fact that they involved sheer rote memory. The other material was richer in associations and meanings which might facilitate retention.

When the material is overlearned, that is, given more repetitions than necessary for immediate recall, the curve does not fall as rapidly. This point is brought out in Figure 7 which deals with several thousand sixth-grade children taking four-minute tests on the content of a passage they had read. The abscissa represents the time in days and the ordinate, the amount retained taken as a percentage of the amount originally learned. The general trend is indicated by the heavy curve which shows

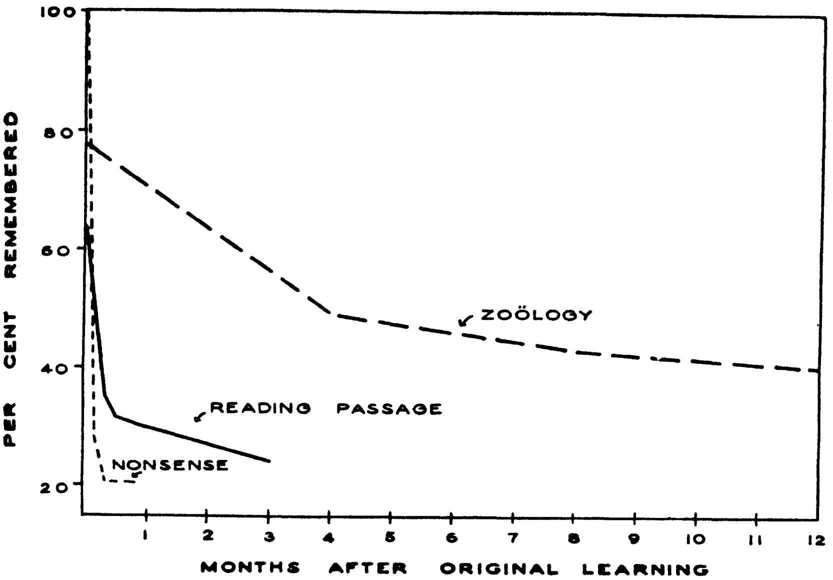


Figure 6. Curves of Forgetting.

the amount recalled at varying lengths of time after the initial learning. It follows the typical trend like that shown in Figure 6. Certain subgroups, however, took re-tests at various intervals after the original learn-

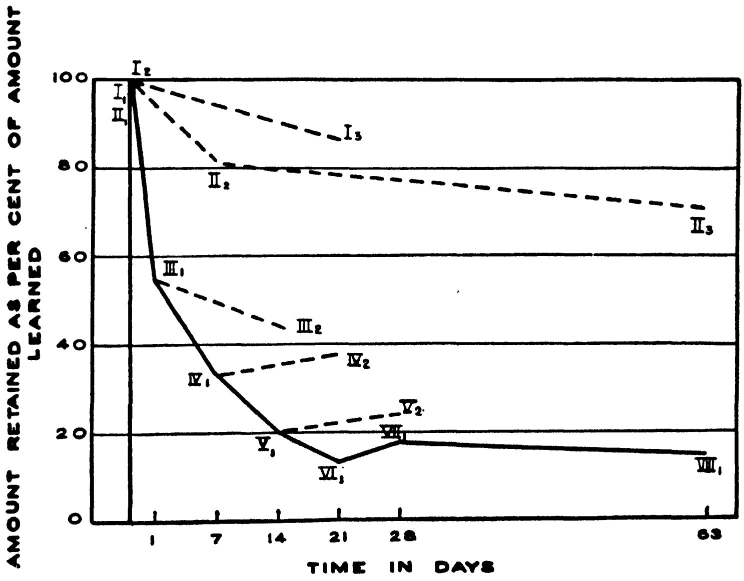


Figure 7. Retention with Review at Various Periods After Initial Learning.

ing, and these re-tests consisted essentially of additional repetition or review of the material. They were all of constant length. For those who took the re-test immediately after the initial learning (groups 1 and 2), this was tantamount to overlearning. The dotted lines at the top of the diagram show what happened to these two groups. The curves do not drop with anything like the steepness of the main curve.

This leads to another important consideration, namely, the optimal schedule for these review exercises. The remaining curves in Figure 7 suggest the answer. Group 3 had their re-test after one day, and the dotted line indicates that forgetting from that point on was not so bad. They retained about 55 per cent after the one day, with the additional review at that point, and they still had over 45 per cent retention two weeks later. Group 4 had their review later and the results were not as favorable. Group 5 was still worse; their net result after two weeks was only about 25 per cent.[19] Obviously, the early review was appreciably better than the late review. The reason for this is clear enough. When we consider the main curve for a moment, we find that if a considerable period elapses before the review or follow-up, the learner has to begin all over. If, on the other hand, the review comes early, much of the original material is still remembered and is reinforced.

Learning curves may be of considerable assistance to the teacher because of the graphic way in which they show the progress of the individual learner. The teacher should study these curves with as much interest as an industrial executive studies graphs of production. On the other hand, the curves should not lead to the notion that learning is an impersonal, isolated process. A particular learning experience is just an episode in the learner's total life and is part of a very complex situation.

Further Aspects of the Learning Situation

Teaching aids. The learning program often can be facilitated by various teaching aids. The desirability of a provocative school environment has been mentioned. Some provocative items may be provided systematically. Charts and diagrams are old stand-bys. Moving pictures are playing an increasing role: these include geographical films, animated views in connection with science, documentary films for history, and special films for health education. During the war the military organizations made extensive and effective use of teaching films, showing such processes as maneuvering on skis or the method of taking down a machine gun. Radio is another teaching aid. Many stations broadcast material of an educational nature designed specifically for the schools. These are picked up with receivers in the schoolroom and supplemented with material provided in manuals. The experts in the studio do a better job of presentation than could be done by the average teacher. It is possible to make the past live again dramatically or to bring to the classroom some notion of the great variety of present-day life. In current events study the pupils around the radio can be present while history is actually in the making. Another common aid is to take the pupils on trips to various places, like the City Hall or the railroad station, which are related to the subject under discussion. One advantage of these teaching aids is their high interest and motivational value.

---

[19] Spitzer, H. F., "Studies in Retention," *Journal of Educational Psychology*, 1939, 30, 641–656.

The teacher's attitude. Another important consideration in the learning situation is the actual attitude of the teacher. The conventional teacher devotes her efforts largely to giving assignments and quizzing the students on those assignments. A commendable trend in recent years has been to devote considerable time to orienting the students and relating the subject to everyday life. There is experimental evidence that this orienting approach yields dividends. A study was made of two types of schools: in the traditional schools studied about 95 per cent of the teachers' efforts were devoted to assignments and quizzes, and only about 3 per cent went to orientation; in some experimental schools, about 20 per cent of the time was spent on assignments and quizzes and 72 per cent on orienting. The pupils' behavior was rated by the investigators according to the amount that showed mere memory and the amount that showed initiative. In the traditional schools 96 per cent was memory and 3 per cent initiative, whereas in the experimental schools the figures were 15 and 75 per cent respectively.[20] The desirability of developing initiative is scarcely debatable because it is called for in so many life situations. College teachers who have pupils coming to them with different kinds of secondary school backgrounds quite generally testify that those from the more modern type of school show more initiative, are much more on their toes, and are able to work independently. Much of this doubtless can be traced back to the influence of the teachers who have assumed an orientating point of view.

Socialized instruction. Some schools apparently forget that the schoolroom contains more than one child. All the children sit facing the teacher and are supposed to ignore each other. This situation fails to take advantage of certain fundamental characteristics of human behavior and also misses an opportunity to give some social training along with the academic training (page 105). Other schools go quite definitely in the opposite direction and attempt to socialize the instruction. The chairs are movable so that small groups of pupils may talk and work together. A group of pupils may be turned loose on a project and allowed to discuss it freely with each other during the class period. They may even go out into the community to gather data.

---

[20] Wrightstone, J. W., *Appraisal of Newer Practices in Selected Public Schools.* New York: Teachers College, Columbia University, 1938.

This latter procedure has a number of advantages. For one thing it provides more of a social climate and gives some training in social adjustment. There also is experimental evidence of what is termed social facilitation—people working on the same task simultaneously tend to stimulate each other to greater efficiency. This has been proved especially true in the case of children. One experiment on socialized instruction may be mentioned. Two samples of school children were compared over a period of four years. One group was definitely socialized in their program, and the other was conventional. They were checked at the end of the period by standard achievement tests in the subjects involved, and the socialized group was 30 per cent better than the control group, and was actually 11 per cent better than the national norms in the particular subjects involved.[21]

Individualized instruction. Another desirable feature of the learning situation is the individualization of instruction. This point was mentioned earlier in connection with adjustment to individual differences in intelligence. The teacher should diagnose individual difficulties by tests or other devices and then adjust herself to the individual's needs. When pupils learn to write longhand, they have varying difficulties in forming the letters. If the pupils all receive the same instruction, some will spend more time than they need on such things as making O's. An elementary arithmetic class of twenty-one pupils had their instruction completely individualized. A control group of children of the same age, grade, intelligence, and initial arithmetical skill spent the same amount of time on the subject but ordinary group methods were used. The individualized group increased their skill nearly 50 per cent over that of the control group.[22] These adjustments to individual differences should also be extended to include differences in interests and attitudes.

Outcomes of Psychology in Education

General increase in rate of learning. Finally, it is in point to consider the over-all result of educational psychology techniques like those discussed above. For one thing, they speed up learning. When handwriting was being taught, for example, some pupils followed the conventional procedure, and some had special, standard practice exercises with individualized instruction so that each progressed at his own rate, measured his own progress, diagnosed his own difficulties, and practiced on them. Sixth graders who followed the old procedure improved about 35 per cent, whereas the other group improved 60 per cent.[23] Again, when sixth-grade children were being trained in silent reading, they were continually urged to speed up, were shown their own learning curves, and were urged, "Don't whisper." A group that followed this program for twenty-eight days went from 170 words per minute to 425 words per minute in reading rate. Eighth grade norms are 280 words per minute and these sixth graders went above that.[24] The army had notable success in teaching illiterates to read in a few weeks by employing methods similar to the above.

---

[21] Collings, E., *An Experiment with a Project Curriculum.* New York: Macmillan, 1923.

[22] Pressey, S. L. and Robinson, F. P., *Psychology and the New Education,* page 459. New York: Harper's, 1944.

A comprehensive study was made of a number of schools that had integrated activity-project programs in contrast to schools following traditional programs. They were evaluated as to comparative progress in school subjects, information, belief, and adjustment of pupils to the school.[25] The data were treated from the standpoint of the statistical significance of differences in the scores between the two types of school. At the elementary level the following aspects had differences favoring the activity-project schools by at least three times the standard deviation: primary reading, primary spelling, primary language, current affairs, beliefs, graphic arts, skill in obtaining facts, personality adjustment, and self-initiated activities. Only one item favored the conventional school. At the high-school level, significant differences favoring the integrated-activity schools were found for literature, facts, work skills in social science, civic beliefs, science beliefs, self-initiated activities, cooperative activities, and honesty in a self-marking test. Three items favored the conventional school but the differences were not statistically significant.

Permanence of learning resulting from the foregoing techniques is not as clear-cut. The value of overlearning from the standpoint of retention has been discussed. Learning which takes place under a high incentive is apt to be impressed upon the individual more than work which is done with less incentive and no intention of remembering it.

---

[23] Courtis, S. A. and Shaw, L. A., *Courtis' Standard Practice Test in Handwriting* Teacher's Manual. Yonkers: World Book Company, 1921.

[24] O'Brien, J. A., *Silent Reading*. New York: Macmillan, 1921.

[25] Wrightstone, J. A., *Appraisal of Experimental High School Practices*. New York: Bureau of Publication, Teachers College, Columbia University, 1936. Also Wrightstone, J. W., *Appraisal of Newer Elementary School Practices*, page 221. New York: Teachers College, Columbia University, 1938.

Some records of permanence, however, are rather disquieting—for instance, the way punctuation errors decreased from the third to the tenth grades, but increased again in college. The best that can be done is for the teacher to impress the material well upon the pupils at the time of the original learning, cause them to work at a high level of attention, and utilize the various devices described previously for facilitating learning. Then there is some presumption that the results will persist longer.

Transfer to other school subjects. An educational problem which loomed large a generation ago was that of transfer of training, that is, the extent to which study of one subject would facilitate performance in some other subject. The writer vividly remembers his high-school Latin teacher's dictum that there is no better way to train your mind than to conjugate *nauta bonus*. The point was stressed that the study of Latin would improve English vocabulary. Nobody raised the question as to what would result if the same amount of time was devoted to studying English vocabulary directly. Eventually an experimental approach was made by giving pupils a test in some subject, submitting them to another experience which was supposed to transfer to the original subject, and then giving a final test in the first field. In some such experiments there was actual improvement in the second test and it was attributed to the intervening practice on the other function. Then someone came along and introduced a control experiment in which pupils took the two tests with nothing in between. They improved also, which suggested that the results were not due to transfer but merely to the organization, or settling down, of the material (page 25). Further experiments revealed that the gains were mainly in items which were identical in the two situations. Training in Latin did help English vocabulary some, but only in words which were of Latin origin. It had not trained the mind in any further inscrutable fashion. Similarly, practice in simple addition improved facility in multiplying two-place by two-place numbers for the obvious reason that some addition actually is required in the process of multiplying. It sometimes is found, however, that conflicting associations interfere with these identical ones. For example, when graduate students were given the simple algebraic problem of expanding $(x+y)^2$, 6 per cent of them failed. When the problem was in the form $(b_1+b_2)^2$, 28 per cent failed. Evidently the unusual symbols threw them off by producing conflicting associations and they got subscripts mixed up with exponents. The upshot is that transfer occurs primarily when there are identical elements. More important than this, however, is the question of how much actually is gained by studying a subject for its transfer value. Such gains are much less than those that could be made by studying the desired subject directly. The best way to increase English vocabulary is to study English vocabulary. Practice in multiplying helped general mathematics some 29 per cent, which was an appreciable transfer, but practicing in multiplying helped actual multiplying itself 112 per cent when the same amount of time was involved.

There are some possibilities of transfer of habits of work and attention. Skill in taking notes in one subject might make taking notes in another subject easier. There would be no point to this procedure, however, unless the first subject was valuable in itself, because taking notes in the second course would improve note-taking in that course anyway. As far as the psychologist knows, there are no subjects which have peculiar transfer value, and mental discipline is a thing of the past.

Transfer to later life. A further outcome of education, in a way one of the most important, is the extent of transfer to later life. After all, children do not attend school merely to keep out of mischief, but to derive skills and points of view that will stand them in good stead in the social life they will later experience. There has been comparatively little experimental work done on this ultimate type of transfer. There is a possibility that some work methods may carry over from school to life situations. Some indication of this was found in a college program that provided remedial work for students who were in academic difficulty. The students were diagnosed and given individual instruction, and they studied under expert supervision. The important element in this program was improving their work habits along the lines to be discussed in Chapter 7. Two groups of students in similar academic difficulty were selected, and one group followed this remedial program while the other followed the normal program. At the outset, the groups were passing satisfactorily 25 and 27 per cent, respectively, of their academic work. In the academic quarter under investigation, members of the experimental group passed 70 per cent of their courses and members of the control group, 34. Thus, there was presumably some transfer of work habits. A follow-up of people taking such a program indicated that those undergoing this experience stood a greater chance of remaining in college than did those in similar difficulties who did not participate in this program.[26]

Other possible transfers to later life lie in the field of interest. A pupil may become interested in art or literature to the extent that he pursues it subsequently as an adult, leisure time activity. One investigation revealed that interest in athletics, literature, music, public speaking, and religious activities carried over from a private school into adult life in from 10 to 40 per cent of the cases.[27] If the school can inspire interest in this way, it may constitute a distinct social contribution because many people are unhappy or delinquent just because of the monotony of their lives and the narrowness of their interests.

---

[26] Pressey, S. L., *et al., Research Adventures in University Teaching.* Bloomington: Public School Publishing Co., 1927.

Pursuing a vocation learned in a technical school would be an obvious instance of transfer. Moreover, certain basic skills like reading, writing, and mathematics contribute to success in almost any vocation. Finally, the school's contribution to social adjustment is pertinent in the present connection. There were indications, for example, that pupils in an activity school attended parties, belonged to farm clubs during vacation, read books in the summer, practiced common health habits, and saved money to a greater extent than did pupils in an ordinary school. After all, when these young folks get through school, they are going out to live with other people, and anything the school can do to facilitate that subsequent adjustment is highly desirable. We shall note in later chapters some of the things which happen when adjustment is inadequate.

Summary

Many of the basic principles of learning which have been developed in the laboratory are applicable to the school situation. The law of use involves simply repetition of the desired response. The converse law of disuse permits undesired responses to drop out. The law of effect deals with the satisfaction or dissatisfaction which follows a response. Both aspects facilitate learning, and there is a hint, at least, that in the average school situation reward may be slightly superior to punishment. Learning is also more effective when the individual is ready for it with adequate motor development or adequate vocabulary.

Motivation is necessary for effective school progress. Competition is frequently used, and, other things being equal, individual competition is slightly superior to group competition. Prestige is a somewhat related motive. Knowledge of results is shown to be quite an effective motive and sometimes takes the form of a self-instructional program. Interest, often generated by the enthusiasm of the teacher, is another common motive.

Learning by doing is superior to passive listening; learning in context is preferable to learning in the abstract. Partial activity, that is, devoting most effort to the difficult portions, is desirable. Retroactive inhibition due to intense effort immediately after learning something should be avoided. Distribution of repetitions allows material to organize between times. Whole-learning is superior to part-learning because many associations between units may be formed incidentally. Learning with the intent to remember may be implemented by making the material appear meaningful and worth while. Overlearning often is desirable in the interests of ultimate retention.

---

[27] Reavis, W. C. and Van Dyke, G. E., *Non-Athletic Extracurricular Activities.* United States Office of Education Bulletin, 1932, No. 17, Monograph No. 26.

In a learning situation, some check on progress is desirable. The written examination prepared by the teacher is the old stand-by. Its limitations are the fact that it samples only a small amount of the information involved in a course, and grading is often unreliable. Oral examinations sometimes are used at the higher educational levels. Teachers are making increasing use of objective examinations which involve selecting alternative answers, completing sentences, or matching items. Such examinations can be scored unequivocally and they also give a larger sample of performance. They may tend to teach the pupils the wrong answers but this can be obviated in subsequent discussion of the examination. They are based merely on information rather than ability to think and organize, but, with ingenuity, it is possible to arrange items which involve more intellectual activity. Achievement tests have been published for many school subjects and these tests have been standardized on large numbers so that it is possible to compare any school population with the general norms. Such tests are also useful in diagnosing individual difficulties.

It is often helpful to show the results of learning graphically by plotting a curve with successive periods of practice on the abscissa and performance on the ordinate. One type of curve shows the trend of a function through the school grades and is used in lieu of following the same group of individuals through a period of many years. Such curves show when most of the learning in a particular function takes place and indicate when instruction should begin. The other type of curve indicates the progress of the individual student over a shorter period of time. It shows a rapid initial rise due to the acquisition of a few new associations, daily fluctuations because of ups and downs in attitude and physical condition, and then a leveling off when approaching the final limit. Sometimes a plateau occurs in which there is a considerable period of no progress followed by a subsequent rise. This may be due to the automatization of lower order habits which is necessary before those of a higher order can be established, or it may be largely a matter of motivation.

There are interesting possibilities in the derivation of the equation of the learning curve. When this is achieved, it should be possible to put the individual's data into the equation and extrapolate.

The curve of forgetting shows that after something has been learned, forgetting ensues quite rapidly at the outset and then levels off. This rapid drop can be forestalled somewhat by overlearning. Moreover, if subsequent repetitions are to be given, it is better for them to occur early, before too much of the effect of the first presentation has been lost.

Teaching aids such as moving pictures or radio may be used to enrich the school environment The teacher herself may well give more attention to orienting in contrast to mere quizzing. Socialized instruction contributes to social development as well as being an effective instructional method. Individualized instruction is highly desirable in some cases, particularly when preceded by diagnosis.

Transfer from one school subject to another occurs primarily when there are identical elements in the two cases It is not worth while to teach a subject for its transfer value unless it has some intrinsic value of its own. Transfer to later life is more important. This may take the form of work habits, interests, vocational skills, and, to some extent, social adjustment. After all, the school is preparing people for life in a community.

7

PERSONAL EFFICIENCY

THE PRECEDING CHAPTER was directed toward the teacher's attempts to facilitate the educational progress of the pupil. At the higher academic levels, however, there are many things which the student can do for himself to this same end. In high school and college he is much more on his own. His study habits, work skills, and the way he organizes his program may be important elements in determining his progress. These habits and skills may extend their usefulness into his later life, particularly if it is professional or executive. Apart from actual study, his attitude toward his work, his control of attention, memory, and emotion, the development of his interests, and even personality factors have a bearing on his over-all efficiency. The present chapter will begin with a consideration of methods of effective study at the higher academic levels, followed by a discussion of personal efficiency in its larger life setting.

Investigation of Study Difficulties

There are two approaches to the discovery of effective study methods at the higher academic levels. One approach is to compare people who are having study difficulties with other persons who are not experiencing such difficulties, in such variables as methods of note-taking. The assumption is that the points in which these groups differ are pertinent to the development of more effective methods for anyone. The other approach is to do research directly on study methods assuming that no one is perfect. For instance, the best method of reviewing material can be determined quite in the abstract.

Diagnostic approach. The first of the approaches just mentioned has been followed in connection with college courses designed to help students who are handicapped in study skills. Detailed investigation is made of the students in such courses and then, for certain variables, observations are made upon control students in other courses. For instance, the instructor inspects notebooks, looking for such things as adequate size, loose-leaf arrangement, legibility of writing, labeling of topics with appropriate headings and subheadings, quantitative adequacy of the notes, or evidences of their having been taken at top-speed. He watches the students in a study room, noting whether they concentrate consistently or respond to every distraction. Diagnostic tests[1] are used to locate difficulties in vocabulary, grammar, punctuation, spelling, simple mathematics, familiarity with the library, ability to use the dictionary, facility in reading graphs, speed and comprehension of reading with different kinds of material. It is frequent practice to photograph the student's eye movements while he is reading with a view to detecting inefficient habits on that level. Another device is a questionnaire filled out by the student or an interviewer. It involves such questions as whether he skips the graphs when reading a book, or whether he keeps the notes for one academic subject all together.

Typical results of diagnosis. When specific and presumed difficulties are discovered in the handicapped group, a control group that is doing adequate academic work is studied with reference to the same specifics. If the handicapped group is inferior to the control in certain respects there is reason to believe that those particular respects are causally related to the academic difficulties. An inquiry form based on this premise[2] was filled out by 200 college students and an analysis was made of the forms submitted by the 50 with the best academic record compared to the 50 at the other end of the academic distribution. Out of 125 items, a small number showed statistically significant differences between the groups at the two academic extremes. Some of these items appear in Table 6, which gives the differences between the percentages of failing and superior students who indicate particular work habits. For instance, a certain per cent of the failing students indicated that they skipped graphs and tables in their books; a certain per cent of the superior students did too. The former per cent is 40 more than the latter. Similarly, 32 per cent more of the inferior students failed to look up words in the dictionary.

Such findings were useful in setting up a course of remedial instruction. Incidentally, the students in this remedial course were salvaged to a commendable extent. When groups are matched as to native capacity and approximate academic disability, one group taking the remedial course and the other pursuing the ordinary program, a higher percentage of the former usually remains in school, whereas the other group suffers a higher mortality.

---

[1] See Robinson, F. P., *Effective Study.* New York: Harper's, 1946.

[2] Pressey, S. L., *et al., Outstanding Research Adventures in University Teaching,* page 8. Bloomington: Public School Publishing Company, 1927.

Experiments on the development of more effective study methods. The other approach to the problem makes no assumption that good students have effective study methods and poor students have inadequate methods. It is possible that the good students succeed in spite of poor methods. For instance, a group of soldiers in an ASTP unit were shown to be a select group on the basis of intelligence tests and previous scholastic records. However, when they were given some routine checks on study skills, they were no better than other students at the college where they were stationed.[3] Evidently, they had succeeded in school in spite of mediocre study skills. The reason for this mediocrity is obvious. Specific instruction along these lines is seldom given in the course of academic work. The student merely picks up his own study techniques by trial and error just as he might develop a dog paddle if left to his own devices in the water.

TABLE 6

Percentage of Failing Students Showing Certain Work Habits in Excess of Percentage of Superior Students.*

Not study daily in same place	36%
Skip graphs or tables in textbooks	40
Not look up unfamiliar words in dictionary	32
Not skim a chapter before reading in detail	28
Take notes in class as rapidly as can write	32
No outline form in notes taken	28
Sit up late the night before exams	40
Try to memorize the text in preparation for exam	28

* Pressey, *et al.*

In the field of study skills there have been investigations of such things as the cues occurring in textbooks in the way of headings. When students were deliberately taught to take advantage of these headings and note the general topic of a paragraph before reading it, their performance was better. Similarly, research on the most effective schedule for reviewing material or on the effect of recitation has brought out general points which may be helpful even to the average or bright student who apparently has no handicap but may not be attaining his maximum effectiveness. The following discussion will draw on the findings from both the diagnosis of persons who are obviously handicapped, and the outright research on certain aspects which may be pertinent regardless of handicaps.

---

[3] Robinson, F. P., "Study Skills of Soldiers in ASTP," *School and Society,* 1943, 58, 398–399.

Work Place

Desk. A student should give some consideration to the actual place in which he does his intellectual work. Many desks are badly cluttered with distracting items—photos, mementos, football schedules—which do not pertain to the business of studying. If a student sits down to study but is confronted with a photograph of a friend or a football schedule, he probably thinks about something other than history or mathematics. Another advantage of a businesslike desk is that one gradually forms an association between that desk and studying. This constitutes a "place habit." If one does nothing but study at this particular location, there develops an association between that place and that activity. Thereafter, merely sitting at that desk leads, by a normal process of association, to the activity of studying. On the other hand, if one uses the same desk for playing bridge, reading the newspaper, or writing personal letters, then when one sits down, one is just as apt to think of any of those activities as of the history assignment.

Posture. Another aspect of the work place is the actual posture of the student. Most persons can do better work sitting on a chair in a more or less upright position so that there is a little muscular tension. After all, concentrating involves some muscular adjustments and if there is too much relaxation the opposite attitude results. Studying in a reclining position is ineffective for most people because reclining is the first stage of going to sleep. If a person becomes too relaxed physically, he is more inclined to become mentally relaxed as well and may even doze off. For the same reason, it is probably inadvisable to put on one's pajamas for study because that particular garment is associated primarily with sleep, and a lowering of the attention level will result.

Illumination. Adequate intensity of illumination should be provided for the work place, although more than an optimal amount is unnecessary. Bright sources in the periphery of the visual field are undesirable. These may result from glare from a polished surface. Such sources lead the eye to fixate them, then it is necessary to return to the work, and the resultant focusing back and forth becomes fatiguing. This point will be discussed in more detail in connection with industrial lighting.

It is undesirable to have too much contrast in the total visual field. If, for example, the upper part of the field is very dark and the work itself very bright, there is apt to be a sharp line of demarcation between them which again will serve as a focus for attention and fixation with resultant ocular fatigue.

Ventilation is another of these environmental factors which may be significant. Experiments show that although a person doing mental work can rise to the occasion in a hot, humid environment even though he does not feel like it, he normally compensates by slowing down. The discomfort itself is a distraction.

Distractions. It is desirable to eliminate any other sources of distraction. Moving visual stimuli are insidious in attracting attention, even in the periphery of the visual field. Everyone has had experience with a stationary object at one side which did not attract his attention until it began to move. There are marked individual differences in response to distractions as may be discovered by watching people in the library: some look up every time the door is opened or anyone walks by, whereas others seldom do so. However, it is desirable to eliminate distractions rather than make it necessary to resist them. Studying where one faces a door by which a lot of people move, or a window looking out on traffic, or even in a location where these distractions are in the margin of the field of vision renders one liable to a lot of wasted time.

Another type of distraction is auditory. In the laboratory it sometimes is found that a person can compensate for the distraction by greater effort, but it actually takes more out of him from the metabolic standpoint. Some doubt may be raised as to the advisability of the common practice of studying to the accompaniment of radio. To be sure, a person can form a habit of doing mental work under some peculiar condition on which he becomes dependent. There is the musical composer who could not do his best work unless he had a rotten apple in the drawer of his desk, or the person who could not do effective mental work unless he wore a certain hat. It is conceivable that one might become dependent on radio in the same way. However, it is highly probable that the same individual, if he had not formed the habit of using the radio accompaniment, could work at a still higher level of efficiency.

One experimental investigation throws some light on this problem. Three comparable groups of college women were selected on the basis of intelligence and rate of reading as revealed by tests.[4] They took, at the outset, a standard reading test which comprised ten minutes devoted to vocabulary and twenty minutes to comprehension of paragraphs. Each group then took a second form of the test. One group did this with no distraction at all; the second group had classical music (symphony) playing throughout the thirty minutes; and the third group had recordings of popular music (dance bands with vocal chorus) playing. The groups ranged from fourteen to nineteen persons. The control group showed no significant difference between the two tests; neither did the group with the classical music. With the popular music, there was no significant difference in the vocabulary portion of the test, but a very clear difference in the paragraphs portion—the score dropped from 48 to about 23. It was thought that this trend might reflect habits of working with or without the radio. However, when the results were computed separately for those who normally ran the radio while studying and those who did not, the same trend was found and with very much the same magnitude. As far as this experiment went popular music was found to serve as a definite distraction. Such music may be more insistent than the classical because of its familiar and easily grasped rhythm and the fact that, for some subjects at least, it is more replete with associations. It reminds them of dances and things. It had no effect on the vocabulary materials which were somewhat intermittent and unrelated, but with the more complex paragraph material which required sustained effort the popular music was unfavorable.

---

[4] Henderson, M. T., Crews, A., and Barlow, J., "A Study of the Effect of Music Distraction on Reading Efficiency, *Journal of Applied Psychology,* 1945, 29, 313–317.

Efficient Use of Time

Budgeting time from day to day. Investigations of students in academic difficulty indicated that an outstanding fault was failure to use their time profitably. A surprising amount was wasted. A good approach for any student is to keep a detailed diary of what he does every minute of the day for a few days, and then total the different kinds of activity. He may be appalled at the amount of time spent listening to the radio, engaging in conversation, or playing bridge. If such is the case, the obvious solution is a time budget which indicates what he proposes to do with each waking hour. All the time is not devoted to studying, by any means. Adequate provision is made for recreation and extracurricular activities, but they are held to a reasonable amount as per schedule.

There is some advantage in having the same schedule each day provided it fits in with the academic schedule. It thus becomes habitual, for example, to study history every day at 1:00. A by-product of this time budget is the completion of assignments on time because periods have been allowed in the budget in which to prepare them. Another incidental value is that having a terminal point to a period of study provides motivation. If a person *has* to get a thing done by three o'clock, there is some presumption that he actually will do so. It is like the results of some experiments upon committee work, in which some committees worked *ad lib* and others had the time for adjournment set when the session began. The committees with the time limit were more effective.

Time of day. There is a further question as to the advisability of having certain subjects late or early in the day. Numerous investigations have attempted to ascertain whether a person is more efficient in general in the morning than in the afternoon, or whether efficiency depends upon the kind of work he is doing, such as mental *versus* motor. Equivocal results have been obtained in such experiments (page 570). There are, however, some indications that work done shortly before going to sleep is a little different from work followed by a lot of the day's activity. Experiments suggest that it depends on the kind of material involved, with rote memory profiting most by study just before sleep.[5] Different sets of material were learned under identical conditions except that some material was recalled after eight hours of sleep and other material after a similar period during the day when the subjects were engaged in other activities. Memory of a story plot yielded scores of 87 and 86 respectively under the two conditions. For nonessential elements in the story, however, which were more a matter of rote memory, the corresponding figures were 47 and 23. There was an obvious advantage in learning the rote material just before sleep. This result suggests that it is better to arrange to study the more routine materials late in the day, whereas with logical material, it makes little difference when it is studied.

Planning ahead. This matter of budgeting time should be extended to include long-time planning. It is unfortunate if things work out so that at the end of a semester or quarter there has to be a period of intensive cramming. As noted elsewhere, distributed repetitions are more efficient because they provide opportunity for the material to become organized and integrated. Furthermore, the usual period of cramming involves emotional disturbance, loss of sleep and of recreation, and throws the student out of step with reference to his general hygiene. It is desirable to have some kind of a work schedule during examination week just as during any week. It will be more intensive perhaps, but one can follow it with reasonable equanimity.

Effective Reading

General preview. It is good practice when an assignment is being read to make a preliminary survey of a chapter or at least a substantial section of it before reading in detail. Sometimes the table of contents is copiously subdivided; sometimes topic headings are emphasized by special typography; sometimes there is a summary at the end of the chapter. If the author says "three reasons," it is a dead give-away as to points to be noted. If none of these devices is available, it may be necessary to skim through the material quickly to get the over-all view. It is of passing interest to note that frequently an instructor who is making up examination questions will look back through the headings in the textbook.

---

[5] Newman, E. B., "Forgetting of Meaningful Material During Sleep and Waking," *American Journal of Psychology,* 1939, 52, 65–71.

There is experimental evidence that this type of quick preview is helpful. A group of 118 college sophomores were divided into two groups equated with reference to intelligence and academic standing. One group was shown how to skim over headings and summaries, and the other constituted a control. The two groups read a selection and were tested on speed and accuracy. The experimental group read 20 per cent faster than, and just as accurately as, the control.[6]

Along this same line, it is helpful if the student has actual questions in mind before he undertakes to read a particular section. Sometimes the teacher provides such questions. A group of 80 students read material in science and English literature, having been provided in advance with a list of twenty questions. An equivalent group of students read the same material without the benefit of the initial questions. When given a subsequent test comprising these twenty questions and twenty others, the experimental group did as well as the control group on the new questions, and did better than the control group on the original questions. With all the selections employed these differences were statistically significant.[7]

It is also good practice for a student to stop occasionally while reading an assignment and think over what has been covered up to that point. The end of a main section is a good place for this purpose. This is similar to the practice of having frequent recitations. The effectiveness of recitation in general as compared with merely reading or studying the material was brought out in an experiment described earlier (page 124). When one stops occasionally to think over the material, it may also be helpful to jot down questions or topics for later self-quizzing.

Technical items. A mistake that is made by many textbook readers is skipping technical words. It is advisable to look them up the first time they are encountered rather than the fourth or fifth time, otherwise one may lose the meaning of some important statement. This does not mean stopping in the middle of a sentence to consult the dictionary, but certainly one should not go beyond the end of a paragraph or section before doing so. It is much the same story with graphs and tables. One should be sure that they are understood. All too frequently, a student reading a textbook comes to a graph and says to himself, "Aha, there's a half-page I won't have to read!" Many times that half-page of graph is more significant than several pages of text, and in most books the graphs are intimately related to the rest of the text, so they too should be scrutinized and understood when they are first encountered. Moreover, it is well to scrutinize the graphs actively—recite to oneself, as it were, their meaning. Some students merely stare at graphs blindly hoping they will register much as a photographer gives a longer exposure in a dim light.

---

[6] McClusky, H. Y., "An Experiment on the Influence of Preliminary Skimming on Reading," *Journal of Educational Psychology,* 1934, 25, 521–529.

[7] Holmes, E., "Reading Guided by Questions *versus* Careful Reading and Re-Reading Without Questions," *School Review,* 1931, 39, 361–371.

Special system. Special mention should be made of a technique for studying textbooks that was developed in a course for college students who were having some difficulties in their academic work partly because of poor study habits.[8] This technique is denoted by the abbreviation "Survey Q3R," which stands for *Survey, Question, Read, Recite, Review.* These five steps will be elaborated very briefly. Some of them have been mentioned already. The *survey* involves glancing over the available headings in the chapter to note major points which are to be developed. This should require only a minute or two in order to get oriented. The *question* step takes one section at a time, notes the heading, and turns this into a question. Thus the reader looks for the answer to the question instead of just reading to see what happens, as is done when reading fiction. This *reading* is the third step. The next is to look away from the book and try briefly to *recite* the answer to the question. This should be in the student's own words and should perhaps include an example. It may help to jot down very brief notes in the process. This has the merit of forcing the student to verbalize the answers, whereas otherwise he may have a vague feeling of comprehension which he mistakes for mastery. It also serves to reinforce the material by bringing in another sense department beside vision. However, this procedure should be very brief, and its goal is not a complete outline. Some persons when they see something in italics, drop everything and copy the italicized material in their notes. The final stage is the *review* which occurs at the end of a chapter and not after each small section. It may be facilitated by glancing over the rough working notes which were jotted down in the process of recitation.

A bit of evidence as to the effectiveness of this method may be mentioned. Several groups of students took standard tests of reading rate and comprehension, based on Canadian history. They were then given several days training with this Survey Q3R method and then took another similar reading test. On the initial test the average rate of reading for the students was at the 34 percentile based on norms established on larger samples. On the second test their average was at the 56 percentile. Moreover, the corresponding percentiles for their comprehension scores were respectively 43 and 53.

---

[8] Robinson, F. P., *Effective Study.* New York: Harper's, 1946.

Increasing reading speed. Many persons read much more slowly than is necessary. The assertion that a rapid reader does not comprehend the material very well is a rationalization on the part of slow readers and is not based on facts. If anything, the rapid reader tends to comprehend his material a little better than the slow reader. Certainly there is no cause for alarm about efforts to increase reading speed.

One way to achieve this increased speed is to force one's self, by sheer effort, to work more rapidly until the ability comes. This does not mean skimming the material, but simply trying to go more rapidly and with equal effectiveness. There are occasions when a person suddenly discovers that he is going to have a quiz in ten minutes and has to read six pages on which the quiz will be based. Under those circumstances, he simply *does* read the material more rapidly than normally and probably with equally good comprehension. If a person can simulate this attitude occasionally in his ordinary reading, he may be able gradually to develop the desired habit. If the process becomes too fatiguing, he can stop after short installments and review a bit. Some people have developed much more effective reading habits by this simple expedient.

Some readers are handicapped by the habit carried over from childhood of vocalizing during reading. Worse still, they may simultaneously follow the lines with finger. The normal rate for silent reading is much faster than that for oral reading. If a person does have that kind of a hangover, he should do something about it. He should deliberately suppress the vocalization and, if necessary, hold his tongue between his teeth for a while when reading.

Another important aspect of reading is the control of eye movement. The eyes do not move smoothly across the page but make several fixations, jumping from one to another. All the perception takes place during the fixations. Numerous studies have been made of this function by photographing the eye movements during reading. A beam of light is focused on the cornea in such a way that it does not enter the pupil. The cornea acts as a mirror and reflects the beam of light onto a moving photographic film. As the eye moves across the page or pauses, the image on the film does likewise. With this technique, it is possible to study the eye movements of good and poor readers. The poorer readers manifest many more fixations per line, and they also show occasional regressions as though the eye hit a point too far along the line and had to move back to pick up something that had been overlooked. All this fixating makes for slower reading and more fatigue. It also shows the importance of devoting attention to eye movements with a view to improving reading speed. Without actual photographic equipment, it is possible to observe eye movements roughly by putting a mirror on one page of the book and looking over the reader's shoulder. With the typography such as appears in the average textbook, three fixations to the line is about average. In some instances youngsters have had their speed of reading improved simply by practicing fixating three points in each line—left end, middle, and right end. They do this at first without any effort to read at all, but merely to make their eyes move. Presently they find themselves getting some of the content and eventually they are actually reading in those three fixations.

There are experimental indications that facility in reading may be improved by training with a tachistoscope, or short-exposure apparatus. Such training involves attempting to reproduce digits or other material that is presented for a fraction of a second. It presumably extends the span of perception so that the subject can take in more in a single act of attention. Two groups of adults, one the personnel of a research laboratory and the other citizens in an upper-income group community, participated in thirty training sessions. The training material consisted of numbers of from five to nine digits and also some English words, Magyar words, and geometrical forms presented on the screen for exposures from 0.1 to 0.01 seconds in a systematic schedule. The training sessions were held twice a week. The subjects took standard reading tests before and after the training. In speed of reading the laboratory group averaged a 44 percentile score at the outset and, after training, averaged 71—a gain of 27 percentile ranks. Similarly, in reading comprehension they increased from 52 to 85, a gain of 33. The other group gained 26 percentile ranks in speed and 33 in comprehension.[9]

When one is attempting to increase reading speed, one should realize that some kinds of material require a slower pace than others. Sometimes a good part of a chapter will be devoted to illustration of a main point that has already been made, and thus the material can be skimmed over more hurriedly. Highly technical material may necessitate slowing down.

---

[9] Renshaw, S., "The Visual Perception and Reproduction of Forms by Tachistoscopic Methods," *Journal of Psychology,* 1945, 20, 217–232.

It is also desirable for the reader occasionally to check his own rate and see how many minutes he requires for a given amount of material. He can thus ascertain whether he is making progress.

Taking Notes

Materials. Many academic courses involve taking notes either on lectures or on assigned reading. Diagnostic studies and examination of notebooks indicate appalling inefficiency in some cases. The desirability of a good notebook is obvious, but many students keep valuable notes on the back of envelopes or miscellaneous scraps of paper. A small book is conducive to a cramped chirography which is illegible. The convenience of a pocket-size book does not outweigh the illegibility aspect. A loose-leaf arrangement makes for flexibility in keeping related material together. Even such an obvious thing as a fountain pen deserves mention. Notes kept in ink do not smudge as readily as those kept in pencil and are more permanently legible.

Notes on lectures. It is generally agreed that notes in outline form are preferable. The usual lecture is more than fifty minutes of rambling remarks, and its organization should be obvious to a careful listener. He should be alert for phrases that indicate headings and subheadings. Some speakers pause at a new heading, and the student can soon learn what cues on the part of the lecturer indicate transitions. Incidentally, headings in the lecture notes are useful in subsequent review. The student may cover up all but the heading and quiz himself on the topic. A frequent mistake in taking lecture notes is the effort to get down everything as a stenographer might do. It is better to listen a bit and then write down the main points in one's own words.

Notes on books. In taking notes on books an outline form is desirable, and the student may watch for headings or topic sentences and become sensitive to them. It is well to read an appreciable section before making notes on it, otherwise one is inclined to copy *verbatim*. The notes should be largely in the student's own words. If he owns the book, he can underline the important things and make notes in the margin.

Reviewing

Periodic reviewing during the course. It is advisable for the student to review periodically *during* a course. This review, however, should be selective rather than a repeated reading of the material from first to last. On the first review one can note the difficult portions and subsequently concentrate on them.

In scheduling reviews it is desirable for the first ones to come early.

This is in line with the curve of forgetting discussed previously (page 140). One forgets rapidly at the outset and then tapers off in the process. An early review builds on what is still retained, and a late one makes it necessary essentially to start all over again as most of the material has been forgotten. This periodical review may profitably take the form mentioned above, of quizzing one's self on specific topics, perhaps using the headings in one's notes.

Reviewing for and writing examinations calls for the same selective procedure. It is desirable to make out a schedule for the examination week and budget the time. In the examination room itself the time should be planned. It is a good idea to glance through the whole examination and decide about how much time should be devoted to each question. Then it is well to read the entire question carefully before writing. Some students catch the first two or three words and begin to write, often missing the important parts. It makes a good deal of difference just how the question is phrased. "Outline" or "discuss" call for some organization, and "define" or "list" require quite a different technique. Even if elaboration is indicated, padding is detected and resented by the instructor. It is desirable to have an outline in mind before writing the question, otherwise one is inclined to go round and round. The outline should, if possible, be apparent to the person who is to grade the paper. Finally, it is well to proofread the answers if time permits.

The foregoing considerations apply to the essay type of examination. With the objective type where there are numerous questions, it is inadvisable to spend too long on any one question. A pretty good practice if one gets stuck, is to skip that question and come back later if time permits. If the papers are returned, the student should note the kind of errors he made, whether they deal with facts, interpretation, or organization, thus using the examination as a diagnostic instrument.

Forming and Breaking Habits

The foregoing sections have been oriented toward the student pursuing an academic program. However, many of the points regarding academic effectiveness might help others—business executives, professional people, or any one whose work is intellectual. Some self-diagnosis is possible, by finding the things that one has difficulty in remembering or noting any mistakes which are a matter of comment by one's superiors. Diagnostic tests are not generally available, but if one suspects some difficulty, it is possible to have a psychologist check up on it. Budgeting time is worth while for almost any one. Reading speed for many adults is 30 per cent below what it could be. These considerations border on what is often termed "personal efficiency." Other contributions to this field deal with habit, attention, memory, emotion, and personality.

Economy of habit. The importance of habit in daily activity goes without saying. It is an economical form of behavior in which things are done quickly, accurately, and automatically with little voluntary attention. This economy is obvious in a child dressing itself. At the outset, every garment and button constitute a major operation, but as the process becomes habitual it goes on expeditiously with little conscious effort. Or again when a person is learning to dance, he spends considerable effort in counting and moving the feet in certain patterns, but presently this all becomes automatic and his attention can be devoted to conversation. Hence, the acquisition of habits contributes to the promotion of personal efficiency.

General principles of habit formation. The main principles of habit formation have been discussed already in the school situation (page 115). The same principles apply to habits conducive to personal efficiency. Repetition, or the law of use, is basic. Attention should be called, however, to the desirability in some cases of overlearning in the interest of long-time retention. Exceptions should not be permitted because, in many instances, they actually set up a contra-habit. If, for instance, a person is attempting to form a habit of waking up and getting to work promptly, a few exceptions set him back to the beginning because he now associates the alarm clock with rolling over for another nap. A considerable number of successful performances are necessary to overcome the effect of a couple of lapses. Another point is the desirability of using every opportunity to practice the habit. If, for instance, someone is trying to develop confidence in speaking in public, he should make a speech every time he can find a group willing to listen to him. In accordance with the law of effect it is well to have a desired performance result in some degree of satisfaction. If the habit-former can contrive to exercise his new habit in situations where he will be figuratively rewarded, so much the better.

Breaking habits. The law of disuse is the main principle involved in the breaking of habits. If sitting down in a certain chair has become strongly associated with lighting a cigarette, and one can contrive to sit in that chair a few times when no cigarettes are available, the result may be a breaking up of the association between the chair and the cigarette and the forming of a new association between the chair and some other activity. Most persons are successful in breaking a habit suddenly rather than gradually. One might think offhand that it would be easier to taper off some habit such as smoking in the interest of a gradual emotional adjustment. However, in the example just given, if the individual merely smokes fewer cigarettes in the chair, he is still maintaining the association between chair and cigarette. Some people naïvely make an exception but assure themselves that they "won't count this one." The fact is, however, that the nervous system counts it. The advisability of a sudden break does not apply to narcotic habits where the organism has become adjusted to the drug so that the problem is medical as much as psychological.

Instead of breaking a habit outright, it may be possible to substitute something else for it. A man broke the habit of smoking after every meal by brushing his teeth instead. He simply formed an association between the termination of the meal and this more prosaic but perhaps more wholesome postprandial activity. Other substitutes might be reading, taking a walk, or even singing or whistling. Some persons have been reasonably successful in substituting chewing gum instead of smoking.

The following device has been used successfully in overcoming mannerisms in gesture or speech. When someone is engaged in other work he may be aware of these little lapses and it will help him to keep a record of them and plot a curve to show progress. If he has a pad at his elbow, spends an hour working, and puts down a mark on the pad every time he catches himself making this "funny noise" or whatever the habit is, he can compute the total lapses per hour. If this procedure is followed daily it is possible to plot a curve with the successive days on the abscissa and the lapses on the ordinate. As he sees the curve drop, he gets interested from an experimental standpoint, which produces further motivation. Presently he becomes aware of what he is going to do before he does it and inhibits the act, and the lapses eventually decrease to zero.

Dunlap has suggested a technique for breaking habits which is at variance with the foregoing. At one time he was experiencing difficulty in breaking up a habit of typing "hte" when he was trying to write "the." One day when he was particularly annoyed by this he put a sheet of paper in the machine and typed "hte" time after time while saying to himself that this was wrong. He was happily surprised to find later that he had thus broken up the habit. The technique was extended to other kinds of habits. A person who bit his fingernails unduly during emotional excitement was put on a systematic schedule of biting the nails for a certain period each day when there was no emotional disturbance. The method has sometimes been successful with thumb sucking or stuttering. One reason for success of the method is that doing something like biting the nails when one really does not want to do so is, in a way, punishment and, as noted elsewhere, punishing an undesirable act tends to eliminate it. Moreover, biting the nails in a different setting tends to weaken the association of that activity with the emotional setting. However, this method of breaking habits is limited in its scope and is not necessarily sure-fire. It is not recommended for a person who is attempting to break habits under his own initiative. It is well to employ the technique only under the direction of an expert who is following the case carefully.[10]

Control of Attention

Work place. Many persons have difficulty in concentrating their attention upon a task that is none too interesting. A first consideration in remedying this difficulty is the actual place in which the work is done. The points brought out earlier in the chapter regarding the student's work place (page 154) are pertinent in this connection. A businesslike desk with no distracting clutter, adequate lighting and ventilation, and a reasonably upright posture will contribute to the efficiency of the executive. Sources of visual or auditory distraction should be minimized. In a busy office there is apt to be a good deal of movement, and even though it is in the periphery it may be insistent from the attention standpoint. Much of the distracting noise in a room does not come directly from the typewriters or machinery to the ear of the worker, but is reflected from the walls and the ceiling. The use of porous materials will reduce this reflected noise. Some executives apparently can overcome the effect of noise and carry on long-distance telephone conversations with typewriters functioning nearby, but experiments show that this compensation takes more out of the organism from a metabolic standpoint and may be one reason that many such people burn out by early middle age.

Habits of attention. It is possible to improve the attention level at which one works by developing certain habits. One of these is a place habit which simply involves forming an association between a particular place and a particular task. This was mentioned above in connection with the student's desk, and identical principles apply to the executive. It is not necessary for all work to be done at one place, but the important point is for nothing else to occur there. Some men who function in two distinct executive capacities find it profitable to use two desks. An official of a steel concern who also functions in a charitable organization may do steel at one desk and milk fund at the other. If it is necessary to shift his set from one activity to the other during the day, this is facilitated by moving to the other desk and letting place habits take care of the transition.

---

[10] Dunlap, K., *Habits: their Making and Remaking.* New York: Liveright, 1932.

A related habit is that of working at a certain time. If, for instance, one plans to begin his day at eight o'clock and does it consistently, he will develop a specific association between eight o'clock and work. When the hands are straight up, he will go into action automatically. The average executive who lacks such a habit loses appreciable time in getting under way. There is quite a bit of fussing around, locating the matches, pushing the blotter, flicking off a speck of ashes, straightening the necktie, and, in general, just getting fixed—business which has no relation to the actual work itself. The time habit will short-circuit some of these unnecessary items.

While we are discussing the temporal aspects of work, it is well to mention the fact that some people, at least, seem to be most effective mentally in the early morning hours rather than later in the day. Experimental evidence is equivocal, probably because of individual differences. If, however, a person is definitely aware of his greater efficiency at that time, it may be a mistake to make it a ritual to clean off the desk first thing. If some especially arduous bit of planning and thinking is necessary, something might be said for leading off with that and then coming back to the more routine clean-up which requires less constructive thinking.

Another habit that some persons are able to develop is the habit of sheer concentration. One is especially fortunate if such a habit was set up early in life. Some so-called prodigies reveal upon analysis that the main factor in their success was simply a good habit of concentration. The writer was acquainted with one of these persons who took his Ph.D. under the age of twenty-one, and his success was very obviously due to his ability to concentrate. In the library many of the other students looked up whenever the door opened, but it was necessary to shake him out of his seat in order to get his attention. His father was a teacher, and the youngster, in his early school years, had a desk in his father's study where he did his homework. The father watched him in the periphery of his own attention, and whenever he saw the youngster wandering called him back. By this simple expedient, a habit of complete attention was developed. This does not mean that everyone with this type of guidance becomes a prodigy, but persons who have developed such habits of attention in their early years are fortunate. If one attempts to set up this type of habit at a later time, it is more difficult but not necessarily impossible. Everlastingly keeping at it will help somewhat just as similar effort may increase speed of reading. A device that has helped some people is similar to that mentioned above in connection with breaking habits. When one is doing mental work, each lapse of attention may be considered as an undesirable bit of behavior which should be eliminated. A pad is kept handy on which a black mark is put every time attention wanders. These marks can be totaled to get the number of lapses of attention per hour, and a learning curve can be plotted. Interest in the curve provides motivation, and the lapses of attention may decrease.

Improvement of Memory

Retention. The chapter on pseudo-psychology mentioned some of the shortcomings of commercial systems for improving memory. A few principles will now be discussed that may yield some help along this line. Three aspects of memory are pertinent: retention, recall, and methods of learning. It is primarily with reference to the last of these that anything can be done in a practical way. Retention seems to be largely determined by heredity. With some people impressions persist, the associations are stronger, and a desired item can be brought out on occasion. Nothing can be done to improve this sheer ability to retain.

Recall. About the only useful suggestion regarding more effective methods of recall centers around the principle of constellation (page 25). The usual type of association is serial in character, that is, item *A* is associated with *B, B* with *C, C* with *D,* and so on, so that the only way to recall *D* is by way of *C.* In the constellation, however, every item is associated with every other one, and it is possible for several of them to converge upon a particular forgotten one because they were all associated with it. Thus, the more elements of the original situation that can be reinstated, the greater the chance of recalling the desired item. For instance, if someone seems unable to recall a person's name, he might think back to the place where he met the person originally, think of all the other people who were present, and, by reinstating a lot of the original setting, cause the items in the constellation to converge upon the desired name.

Methods of learning. It is in the field of methodology that there is real possibility of so-called "improvement in memory." Most of the basic principles which are pertinent have been discussed already in connection with learning in school, and can be utilized by any individual who is interested in promoting the effectiveness of his own memory. They will be recapitulated briefly. Working at a high level of attention is advantageous as the more vivid impressions which result will leave stronger associations. Suggestions made earlier in this chapter regarding habits of attention are conducive to this end. The organizing process in learning may be capitalized on by doing absolutely nothing for a few minutes immediately after a period of memorizing or study. This organizing is also facilitated somewhat by distributing the repetitions so that between them there is an opportunity for organization to take place. The lazy man's way in this instance happens to be the best way, namely, doing a little now and a little then, provided, of course, that he does not stop with the "now." Learning in large units rather than piecemeal is helpful, because the associations between the separate pieces can be formed incidentally without additional study. This point applies primarily in instances where one is learning consecutive material. The importance of the intention with which one approaches a learning situation should be stressed again. If one really wants to remember a thing, half the battle is won.

Motor reinforcement—for example, occasionally repeating the material aloud—has a facilitating effect. Occasional reproduction also introduces a certain amount of encouragement because the learner sees that he is making some progress. Overlearning is conducive to long-time retention. The fact that the material can be reproduced right now does not insure that it will be retained permanently. If the individual, in his own learning situation, can tie the new item up with some familiar one, so much the better.

One specific need often mentioned by purchasers of memory systems deals with memory for names of people. Motor reinforcement is helpful in this connection. When one makes a new acquaintance, it is desirable for one to speak his name as well as hear it. This was brought out in an experiment in which the subjects were "introduced" to a series of photographs.[11] With half of the photographs, the subject merely listened while the experimenter pronounced the name in uniform fashion. With the other half, the experimenter spoke the name, and the subject repeated it once aloud while looking at the photograph. The subject was later shown the photographs and required to recall the corresponding names. When the subject repeated the name himself, recall was 34 per cent better than when he merely listened. This difference was statistically significant—about 3.7 times its standard deviation. Although the experiments did not go beyond the single repetition, it is probable that more repetitions of the name at that initial contact would be still more effective. One might contrive to speak the name several times, for example, "Glad to meet you, Mr. Blank. We were just talking about baseball,

---

[11] Burtt, H. E. and Beck, H. C., "Remembering Names Connected with Faces," *Industrial Psychology Monthly,* 1928, 3, 34–39.

Mr. Blank. Do you think they'll be able to play the game this afternoon, Mr. Blank?"

Emotional Control

Emotions may be sufficiently bothersome to impair efficiency. Milder manifestations include worry that distracts attention or annoyance that produces petulant and ineffective behavior. More serious instances are the profound depression that borders on melancholia or the flying into brief periods of rage which might result in damage to machinery or fellow-workers. The writer knows a minor executive with good native capacity who would undoubtedly be in a top position except for the fact that he is prone to bursts of uncontrollable rage. Consequently he holds an obscure job behind some boxes in the far corner of the shipping room. More extreme cases of emotional maladjustment will be discussed in Chapter 10, but the normal individual should take cognizance of the fact that an emotional condition is not an efficient but a disorganized type of response. Hence, the problem of emotional control is pertinent for persons interested in increasing their own effectiveness.

Bodily response. Emotions are influenced considerably by their bodily expression. If a person acts frightened—walking faster on a dark street—the emotion is intensified. An angry person, clenching his fist and gritting his teeth, becomes still more disturbed. Conversely, emotions may be minimized by assuming the bodily response for the opposite emotion.

The most frequent cases where emotional control is needed involve anger or rage. The writer knows of a police officer who is unusually successful in bringing in tough offenders without an actual fight. When asked about his technique, he explained it as "Wait a minute." When the person he is about to arrest comes toward him threateningly, he holds up one hand, palm outward, and says "Wait a minute." This usually has the effect of stopping the offender momentarily and relaxing him slightly so that the officer can get in a few words on the futility of resistance. Doubtless, other things contribute, such as the officer's own facial expression and the absence of excitement or fear, but that moment's delay alters the culprit's bodily and emotional pattern. The writer was once quite successful in prescribing for a choleric individual who worked in a railroad shop. On occasions when something went wrong, when he hit his thumb with a hammer, for instance, he flew into a rage, threw his tools down into the pit under the engine, and then later had to go down and fish them out of the muck. He was painfully aware of his difficulty but unable to do anything about it. He admitted that he also said certain things on such occasions. It was then suggested to him that he concentrate on the verbal features. Whenever the difficulty arose, he was to lay his tools down quietly and then stand back and do the situation justice with his remarks. He tried this and success was immediate. What actually happened was that in the process of laying his tools aside preparatory to the verbal aspect, he became relaxed, thus setting up the opposite bodily response to what would ordinarily transpire in anger. After a time, even the oral response to the situation did not seem as necessary.

In much the same way, undue fear or worry may be alleviated a little by acting in the opposite fashion. Persons who are slightly depressed have, on occasion, helped themselves appreciably by acting as though they felt more cheerful and forcing a corresponding facial expression.

Conditioned emotions. Although there are a few stimuli that produce specific emotions without any training, in most instances one has to learn to be afraid of, or angry at, some particular thing. No one is born with a fear of snakes or an antipathy to commercial advertising on the radio. Conditioned emotional responses are developed toward many such stimuli. Someone is insulted a few times by a person with, let us say, red hair, and therefore develops an antipathy to titians; or he is served fried eggs in an uncouth boarding house where the total situation is unpleasant and develops a lifelong dislike of fried eggs.

This principle of conditioning may be used in a constructive way to control emotions. In the instance of the baby and the rabbit (page 23) it will be recalled that, after the fear of the rabbit had been conditioned, it was re-conditioned, or removed. The infant was given something pleasant—food to eat—while the rabbit was introduced at a distance and then, on successive days of the experiment, was brought closer and closer. The unconditioned stimulus was the pleasant food, and the rabbit now became the conditioned stimulus which eventually led to a pleasurable response. By the same token, if someone wishes to develop a favorable attitude toward an object, he should contrive to encounter that object when something else pleasant is transpiring. If he dislikes to polish his shoes, for example, he might have enjoyable music on the radio during the process. He likes the music and presently may like the shoe-polishing. If he dislikes to go to some particular place, he might arrange to go there frequently in pleasant company, so that the emotion would gradually be transferred from the company to the place itself. This same principle can be used in reverse, as we shall see presently, by arranging to meet a person several times in a situation that is pleasant to him, thus causing him to like us.

Opposite idea. Another possibility of influencing emotions is deliberately building up the opposite idea through the medium of suggestion or auto-suggestion. A person who feels, for example, that he is not being very successful and who lacks self-confidence, may, to some extent, overcome that difficulty by deliberately building up the notion that he is adequate. He may even face himself in the mirror and assure himself that he is fairly efficient as an individual, after all. A bit of auto-suggestion when one is falling asleep at night is sometimes effective. The writer knows a woman who had an almost pathological fear of cats and cured herself by repeating over and over, "I like cats," in those moments half-way between waking and sleep. A man with a little obsession so that he felt that his wrists were vulnerable any time he saw anything with a sharp edge, cured himself by looking at his wrists daily at a certain time and noting how fine and healthy they were. He simply built up the opposite idea, and thus recovered from his little emotional disturbance.

Development and Control of Interest

A person works more vigorously and enthusiastically at a thing which interests him. Many people, fortunately, are engaged in a type of work in which they are interested, but there are occasions when one has to do things which possess no intrinsic appeal. In such cases, it may be sensible to cultivate an interest deliberately.

Bodily expression. Interests, like emotions, may be influenced by the appropriate bodily expression. Just deliberately pretending an interest sometimes will develop it. Many people attend their first opera for social reasons and are bored. Nevertheless, they go through the motions of accepting and liking it; they applaud, tell their friends how nice it was, and even attempt to discuss some technical points; and before long they have a genuine interest in the opera. Similar procedures would be profitable for a person attempting to find his own work a little more interesting. If he acts as though he likes it, talks to his friends about it, smiles while he does it, and in general, goes through the motions, the desired interest may come.

Information about the object of interest. If a person is interested in a thing, he goes out of his way to pick up information about it. The baseball enthusiast reads the sporting news and remembers all about batting averages. This principle works in the reverse direction, and acquiring information about something may lead to an increased interest in it. Industrial workers engaged in a routine job find it more interesting when they are told about the relation of their job to the finished product, where the raw materials come from, and how the product is used. A good illustration of this principle is the case of a young man who was related to important people in the firm and was taken care of with a job that really had little interest for him. He was, however, an extroverted, expansive sort of person who liked to talk and create an impression. Some wise personnel man created a temporary position for him as "reception executive." This position involved merely receiving visitors and showing them around the plant. The young man warmed up to this sort of thing because it appealed to his slightly paranoid tendency for display. He discovered shortly, however, that he knew very little about the place and was asked embarrassing questions. Therefore he began to study up on all aspects of the plant and to familiarize himself with the entire organization. As he gradually acquired this information, he developed an interest in the organization and before very long was ready for a good executive position which led eventually to a successful career. Similarly, anyone may acquire an increased interest in his work by securing more information about it.

Association with other information. It often helps if the object in which it is desired to arouse an interest can be tied in with some other knowledge and especially with everyday matters. If the student of physics sees how the principles operate in his own radio set, his interest in science gains thereby. If one is attempting to develop an interest in some new thing, and can contrive to ascertain its relationship to everyday experiences and other things in one's environment, so much the better for the interest.

Activity regarding object of interest. Doing something will often bring with it some interest in the thing done. It is common practice in clubs and churches to put people on committees with a view to developing their interest in the institution. Similarly, if a person wants to become interested in an institution, he may undertake some assignment in connection with it. The reception executive just mentioned was doing something about the organization as well as gathering information.

Importance of Personality

General nature. A final consideration in connection with personal efficiency is that aspect of the individual subsumed under the term "personality." This term is used in a variety of meanings, but in the present connection, it is essentially social stimulus value, or effectiveness in dealing with people. Other aspects of personality will be discussed elsewhere. The social stimulus value comprises two aspects: the actual equipment which a person has—the more static aspect—and what he does with that equipment—the more dynamic things which operate in a social situation.

Importance. The importance of personality in promoting the individual's efficiency is obvious. In the business field the salesman has to deal with people and influence them favorably toward the product that he is selling. Employees in a complaint department handle irate customers who must be mollified. Many other employees meet the public in some service capacity—in a public utility, or at a cashier's window. At the higher levels are industrial relations executives who devote their time to promoting more wholesome relations between workers and management. Public relations work also requires an acceptable personality.

The other field in which personality is of obvious importance is general social success. Matrimony is one instance, or becoming accepted by a particular social group. Then there is the field of politics where personal relations loom pretty large. Almost any situation where leadership is required necessitates effective personality characteristics.

A rough notion of some of the variables that contribute to effective personal relations in one field may be obtained from the testimony of a group of business people regarding the outstanding faults of salesmen.[12] A checklist was sent to fifty purchasing agents who were asked to indicate the most annoying faults of men who called upon them. The faults which received the largest number of mentions by these agents were: (1) saliva in the mouth; (2) affected manner; (3) mumbling; (4) difficult to understand over the telephone; (5) outlandish gestures; (6) halting manner; (7) coarse or shrill voice; (8) monopolizes the conversation. Some of these annoyances point clearly to personality defects which are amenable to improvement.

Analyzing and Improving the Personality One is Attempting to Sell

Analogy with marketing. Developing and using an effective personality has a direct analogy with the field of marketing. The program begins with market research or consumer analysis, which undertakes to ascertain what the public needs and wants and what aspects of the product they like. The product is modified accordingly, and sales resistance thus minimized. Then the salesman familiarizes himself with all the selling points so that he may use them in the sales situation. He also studies the prospect, noting such things as income and interests, for information about the prospect may enable him to make a better approach in the sales interview. There is the further question of what kinds of appeal are most effective. The salesman often employs suggestion, particularly indirect suggestion—planting an idea without arousing opposition. Sometimes a more rational appeal is necessary, and sometimes he touches off an instinctive process—for example, frightening the person into buying the product. Finally, the salesman follows up the sale with a view to servicing the product and insuring that the customer remains satisfied.

---

[12] Bender, J. F., "Purchasing Agent Lists Speaking Faults of Salesmen," *Printer's Ink*, 206 (March 17, 1944), page 79.

Market analysis. Most of the foregoing features of the commercial selling situation can be followed profitably by a person who is attempting to sell himself to some prospect. It should be stressed, however, that initial analysis of the market is equally important here, not only in the interest of facilitating the actual sale but of maintaining the continued satisfaction of the buyer. Selling a prospect something that he does not really want will boomerang. Ultimately the purchaser becomes dissatisfied and loses confidence in the firm that the salesman represents or comes to regard the salesman himself as tricky and unethical. Similarly, if a person has the problem of selling himself—making himself wanted as an employee, a companion, a member of a group, or as a guest—he should make some preliminary analysis on whether he actually is the person the prospect needs and wants and with whom he will be satisfied in the long haul. If the answer to this question is yes, then he may well proceed along the lines to be described below. If, however, he does not match the pattern that is really desirable for the prospect, then he should either modify his own personality accordingly or seek a different buyer where he will be permanently acceptable. In other words, he should make sure that he stocks the product which the prospect requires.

Aspects improvable primarily by the individual alone. Certain aspects of personality may be improved by the individual when he is not in a social situation at the moment, whereas other characteristics can be developed only when other people are around. When a person deals with the first aspect, one moot consideration for him is his personal appearance. In a way this is the show window. Most of us are not so badly off as the advertisements for toilet accessories would suggest. There are hereditary limits, to be sure, but one does have control over dress and such things as neatness and good taste. Sometimes it helps, too, if one dresses the part. There are certain costumes or accessories that, in stereotyped fashion, connote certain types of career. A professional man sometimes finds it worth while to look prosperous. Carrying a brief case or a medicine case may stamp one as a professional. Until recent years, a bag of golf clubs or a yachting cap had a certain snob value, although now these insignia have become ubiquitous. The medical internes wander around the hospital with stethoscopes hanging about their necks, possibly to distinguish them from other personnel at a lower level.

In connection with dress, it is possible to accentuate good points or to obscure bad ones. The appropriate use of stripes may mitigate or emphasize some aspect of stature. A beard may be used to conceal a defect, and a mustache has been employed to create an impression of greater maturity for the young person in a position of responsibility.

Then there is the matter of facial expression. The more static elements of the countenance cannot be controlled, but the dynamic elements—frowning or looking cheerful—are matters of habit. The person who is continually sour may develop a turning down of the corners of the mouth, and a person who is chronically cheerful, even though deliberately, will gradually cultivate a cheery appearance. If a person discovers from candid photographs of himself that he generally looks like the Statue of Liberty, he may be able to do something about it by deliberately cultivating a different facial expression. When this becomes habitual, the effect on people with whom he has to deal is more favorable.

Some people create unfavorable impressions by mannerisms or, in more extreme cases, unusual grimaces or tics of which they are completely unaware. One way to detect them is through watching a moving picture of one's self. Once discovered, such a difficulty can be brought under control by the techniques mentioned above in connection with breaking habits. If a person becomes distinctly aware of a response each time he makes it, he can gradually inhibit the impulse when it occurs. The simple scheme of keeping a record of lapses and plotting a learning curve often helps. It is much the same story with reference to unfortunate speech habits like undue hesitation, or some such phrase as "er" at the end of every clause, or a stereotyped expression which one uses with undue frequency, or a grunt with a rising inflection. A transcription of one's own speech is helpful in discovering such tendencies. The remedy is the same as that for the other non-vocal mannerisms.

To continue the analogy to personal selling, it is well to analyze one's experiences and skills which might constitute selling points in the sense that they would make one interesting to other people. A person may even modify them somewhat or round them out so that they are still better selling points. Health is one such feature that gives a person status and it may lead to athletic prowess of some sort. Academic success is another aspect that carries some appeal. There are many things in the cultural field—breadth of reading, familiarity with literature, musical accomplishment, musical appreciation and information, dramatic ability, familiarity with current drama, artistic ability, or proficiency as a connoisseur of art objects—which increase one's personality standing. Even travel experience, or military service, or ancestors may be used to impress prospects.

There are some types of social information that may profitably be acquired or increased. The most obvious is adequate information regarding ordinary social usage or amenities. This would include such things as what to do with a fork at the end of a course, or who sits where, or methods of introduction in a mixed group. Information of this type may avoid an embarrassing *faux pas* which will operate unfavorably on a person's social status. Then, there are little customs like remembering special occasions—anniversaries and birthdays. People frequently slip up on this because they forget the date, therefore, it may be profitable to keep a record. Some salesmen do this for their prospects so they can make appropriate mention of the occasion at the right time.

Another type of social information is the mere acquiring of a vocabulary appropriate to the particular group which one desires to impress. In some circles it may be desirable to know how many dollars are involved in a "grand," what kind of a thing is "red eye," or what you really do when you "catch a crab." If someone is talking to a particular group and cannot understand some of their expressions and cannot use them himself, he rates as an outsider. In other circles, a good vocabulary of the best, accepted English is in order.

One other desirable type of information is that which might be useful in small talk. One mark of social competence is the ability to keep a conversation going. This cannot be done successfully without information, or meat, for the conversation. By a little investigation and observation in one's social group, one can determine what kinds of topics go well. These may include such things as current events, movies, radio, or sports. Reading up on these will give a person a little better status and enable him to keep things moving in a conversational situation. In fact, some tests of social intelligence have employed items designed to evaluate this general background of conversational information.

Aspects of personality that must be practiced in a social situation. The characteristics just discussed are of a type that a person could perfect all by himself. There are other aspects of personality that must be developed by actual practice or experience in a social situation. Tact, for example, can be developed only in the presence of other persons. Undue introversion is a socially undesirable trait. Although civilization may need some persons of this type who go off by themselves and invent things and explore new ground in the fields of science or art, social success usually requires the opposite type of personality. It is possible to cultivate such a tendency by deliberately forcing one's self to go up and talk to people or to attend social events contrary to one's inclination. Gradually, reacting in a positive fashion will tend to develop extroversion, particularly if the results are satisfying. A person who is very self-conscious is actually conscious of the wrong person. It will help such an individual to watch the other person instead of thinking about himself;[13] touch football or volley ball would be a better sport than archery for this type.

Conversational ability is something that may be improved through practice. One improvement is to prepare considerable information and have it readily available; one may even go so far as to have certain conversational topics in mind when attending a particular social occasion. If this preparation is planned wisely, the conversation need not lack spontaneity. One can even have some emergency topics available for the awkward pause. It usually slows down conversation if one discusses a topic or answers a question with complete finality. If one's opinion is asked, one may give it but still leave the matter open and throw it back to the questioner for further comment. Otherwise the conversational gambit is killed.

Studying Different Prospects and Adjusting to Them

Individuals. Just as the salesman studies his prospect prior to the interview, it is well for a person who is attempting to sell his personality to other people to make some such initial study of them. Their interests are an important consideration. You can become informed in fields of interest which will enable you to meet the prospects on common ground. If the other party has a physical handicap, some adaptation is called for. It is difficult to make a good impression when you are sitting on his deaf side. Then there is the question of adjusting to prospects of different ages. Very young people feel complimented by the implication that they are older than they actually are. An adolescent girl talking to a boy of about the same vintage, reprimanded him for not having shaved. The implication that he was old enough to need to shave was a back-handed compliment. Middle-aged people, on the other hand, appreciate the implication that they are somewhat younger by a comment on their athletic prowess or the vigor with which they engage in some active pursuit (provided the comment is not overdone). Elderly folks may react favorably to remarks about some immediate product, such as Grandmother's pies. Thus, it helps to study the individual prospects with a view to adjusting one's self to them.

---

[13] See Hepner, H. W., *Psychology Applied to Life and Work*, pages 214 ff. New York: Prentice-Hall, 1941.

Groups. An important group to consider from this standpoint is one's fellow-workers. One should be governed somewhat by their hobbies, their frequent topics of conversation, and their vocabulary. It is especially unfortunate to talk over their heads. It is much the same with reference to members of the community. This is particularly important if a person is moving into a different region and has the problem of adjusting to a new group. If they go in for horseshoes, he should participate to the best of his ability. If bridge seems to be the prevailing motif, it would be well to brush up. The writer vividly remembers a colleague who brought a recently acquired wife to the academic community, and on the first occasion when the bridge tables were set up she volunteered that she knew how to play checkers.

Familiarity. The problem of familiarity, particularly with reference to use of first names, must be considered. Much depends upon the relationship between the two parties. Superiors may resent undue familiarity, particularly in the early stages of acquaintance. It is better to wait for them to take the lead and to observe how well acquainted with them other persons become before using the first name. Inferiors and even equals may like to be addressed familiarly as it seems to give them status. A young person appreciates such recognition by an older person for it implies that he is a worth-while member of the group. It spoils it, however, if the superior or older person uses first names indiscriminately; perhaps a youngster's pleasure at the initial recognition will be ruined if he hears the familiarity extended to someone whom the oldster is known to dislike thoroughly.

Planning the contact. Implicit in some of the foregoing is the notion of planning details of a social contact in advance. Unless a person is very sure of himself, it is undesirable to rely on inspiration: the salesman does not do so, he plans his interviews. The engineer draws up blue prints, and the public speaker has an outline. One item to plan is possible topics of conversation as suggested above. Moreover, if the conversation can take a direction so that some selling point (page 176) may be introduced, so much the better. If someone wishes to utilize the fact that he is an epicure, the conversation should be turned to the topic of food. A successful man in the public relations field uses his wife as a stooge: she brings the conversation around to a topic on which the husband is well informed and can make a favorable impression. If he introduced the topic himself, he might appear conceited. It also may be desirable to plan the location of the contact. Pleasant surroundings will facilitate the sale.

Actual Selling Mechanisms

Suggestion. A few of the actual mechanisms used in selling one's self may now be examined. Suggestion is widely used in commercial practice and involves merely planting the idea of buying the product. In the present connection it is a matter of building up the idea that one is a desirable person. Direct suggestion, a frontal attack, is of questionable value. People resent the blunt suggestion to stop and buy a particular beverage or cigarette, but the suggestion that nice people use the product plants the idea indirectly. In similar fashion a young lady who actually was a culinary incompetent showed her fiancé a box for recipes which her aunt had given her. When the young man's father berated him for the girl's incompetence, he swore that she was a good cook and the box of recipes proved it. Somebody talks about "my favorite opera," thus implying that they know a lot about opera and attend frequently. A girl described in mildly humorous fashion the squabbles on the part of her parents as to the respective merits of the Massachusetts Brewsters and the Virginia Penfields. She thus gave indirectly the suggestion that she had ancestors. "It is always nice to see the Statue of Liberty" leaves the suggestion that one has done a lot of traveling. In ways like these, indirect suggestion may be used to present some individual selling point.

Emotional transfer. Favorable attitudes may be aroused by the mechanism of emotional transfer or conditioning discussed earlier. A person who is getting acquainted with a potential customer or someone with whom he hopes to have pleasant social relations arranges, if possible, that the first meeting occurs for instance, on the golf links or even at the nineteenth hole. A bit of the pleasant emotion aroused by the situation may transfer to the newcomer. In the same way, one should avoid making a new contact at the end of a fatiguing day when the other party is "hot and bothered."

Inflating the other person's ego. It is desirable in general to leave the other person a little better satisfied with himself after a contact. Although direct flattery is effective with certain people, there is always the danger that it may boomerang. For most people the direct approach is obvious and defeats its own purpose. Almost everyone, however, is susceptible if the technique is more subtle. One of these subtle techniques is to ask the other person for advice. Being asked for advice which one is competent to give does elevate one's status. A typical situation is where a younger man is installed as a foreman in charge of a more experienced employee who feels that he should have had the job. The newcomer forestalls a bad morale situation by going to the older man with, "Well, you know more about this angle than I do. Just what would you do?" This approach is disarming, and the older person appreciates being asked even though he cannot give the orders. Another possibility is to impute knowledge to the other party: "I suppose you know about it because you've been there many times." In a case like this, however, it is a mistake to check the person too closely on this imputed knowledge, because he might fail in the test and thus lose status.

Frequently it is desirable to commend people not on themselves but on something in which they are interested. A person may take pride in his children, or his car, or even his dog. Commendation of any of these may arouse satisfaction and a favorable attitude toward the speaker. The same thing applies to hobbies or creative activities, for example, a woman's skill in knitting, or hooking rugs. A girl who asks her husband's grandmother for her recipe for pie crusts has started a beautiful friendship which may even stand her in good stead when the estate is settled. Sometimes it is more effective to commend a man for something which he would like to do well than for some major accomplishment. A business man might not react as favorably to comments on his successful advertising campaign as to compliments on his slightly better than mediocre golf score.

Sometimes a person unfortunately not only overlooks an opportunity to elevate the other party's status but actually goes in the opposite direction and elevates himself at the expense of the other party. A youngster just out of school took a factory job in order to learn the business from the ground up, with an executive position as his ultimate objective. He reported to the machine shop in knickers, soft shirt, and wrist watch—a sports costume which gave the impression that he felt superior and that he was condescending in doing this work at all. Again, some children from a metropolitan district were sent to a farm by a charitable organization. They complained because there was no cheese with their apple pie. Probably they seldom had pie at home but were attempting to impress the rural folks with their superior economic status. Such procedures are worse than no effort at all to promote favorable relations.

Another way to enhance the other party's status is to remember his name, which seems to recognize his importance. The point was made earlier that merely repeating the name the first time one encounters the individual will improve the retention of that name about 33 per cent (page 169). A dramatic illustration of the favorable attitudes created by calling people by name took place with a group of university Freshmen during their Freshman Week. They were divided into small groups under a faculty counselor who took them through various orientation procedures. Their first meeting with the counselor was when they all gathered at a designated point on the campus. The counselor previously had access to personnel records which contained a photograph. He spent some little time in studying the photographs in connection with the names so that when he first met this group of "strangers," he greeted each of them by name. The effect was terrific.

Covering up *faux pas*. One should be alert in a social situation to eradicate the effect of any inadvertent *faux pas*. A useful principle to apply for this purpose is retroactive inhibition—the tendency for something that elicits a high degree of attention to interfere with the memory of something that happened just prior to the event. The everyday instance is getting knocked unconscious and forgetting details just prior to the accident. If one makes some mistake that might leave an unfavorable lasting impression, but can immediately do something else to distract attention, one may disrupt the memory for the unfortunate incident. A joke is one of the best distractors. A lawyer weakened a lot of damaging testimony by cross-examining the witness afterward and causing him to blow up and expostulate in his foreign accent so that the whole situation was humorous. If one can have in reserve a line of humorous incidents which can be applied immediately after any unfortunate situation, the damaging effect of *faux pas* may be minimized.

Humor. One can meet many social situations more effectively with a sense of humor. Tests have been devised for sense of humor, which comprise incomplete jokes with several alternative completions for each, and the subject picks out the one which he considers best. The tests reveal pronounced individual differences. Such a test may help a person determine whether he needs to do something about his own sense of humor. This may be difficult, but if a person observes situations which amuse him, and tries to analyze the basis of the amusement, he may be able to devise similar situations. It is possible also to develop a tendency to look on the amusing side of things, just as one can develop optimism or pessimism.

Follow-Up

Modern selling includes follow-up procedures to keep the customer satisfied. The new refrigerator or automobile is serviced for a certain period. In personality situations, if the first impression is satisfactory, one should not coast along on it indefinitely. It is well to watch the other person's continued acceptance. The mere way in which one is greeted is somewhat indicative, and may reveal cooling off. In that case additional effort must be made.

Finally, in the whole matter of personality development, it is a good idea to assume an experimental attitude which is the basic scientific approach to most psychological problems. This involves analyzing a social situation or problem, trying some procedure that is designed to meet the situation, and checking the results to see if the procedure worked. Sometimes it may be desirable to keep a brief diary of such matters rather than to rely on memory, just as the scientist keeps records of his experimental results. It is so easy in thinking back over situations to remember items that seem to support a hypothesis and forget those that do not. This experimental attitude has the additional merit of carrying a certain amount of motivation. You become interested in your progress from an experimental, as well as a personal, standpoint and thus take it more seriously, make greater effort, and are more systematic about it.

Adult Education

The adult education movement has some implications for the improvement of personal efficiency. Some of the problems discussed above are fairly well cared for by the schools. Some people, however, may have missed such opportunities which may be supplied by adult education. For one thing, it may contribute to the development of interests and resulting better emotional adjustment, which ties in with the whole problem of leisure and monotony. The trend is toward shorter working periods for the average individual and more leisure time. The problem arises as to what to do with this leisure. Some people get along all right because they have adequate interests and avocations to occupy their spare time. Others simply get bored and either sit around unhappily doing nothing or go out looking for trouble—and usually find it. A considerable amount of delinquency can be traced to the fact that some young people have nothing interesting to do. Persons who studied very little literature in school or have had little contact with music naturally are not as interested in those fields as persons who were exposed to them a good deal. The adult education field has a distinct contribution to make in remedying this lack. Persons go to night school, take courses on the radio, or through some extension division, or even by mail, and may study subjects that have certain cultural and interest values, thus arousing interests which they did not have before. Incidentally, the mere process of studying takes up some of their time and reduces monotony. A member of an evening class said at the termination of the course that he thought he would take another one if it was available, because it was better to be doing this than "hanging around at Joe's place." If, in the adult education situation, it is possible to have inspiring teachers arouse interests by their own enthusiasm for the subject under discussion, those interests may carry over and perhaps serve in an avocational way to make better emotionally adjusted and more socially acceptable individuals.

Another valuable feature of adult education is the increase of vocational skills. Somebody working at a machine job decides he will be more effective if he knows how to read blueprints and takes a night course on that subject. Many persons have been up-graded in their job because of supplementary study of this sort. Middle-aged people used to hesitate to do such a thing on the supposition that they were too old and that you could not teach an old dog new tricks. Experimental investigation has indicated that this situation is not so bad as had been suspected. With increasing age, there are slight decreases in facility of forming new associations, but the onset of this disability is very gradual indeed in most cases. There are also marked individual differences: some people slow down at a much later age than others, so there is no reason to hesitate on general theoretical grounds. As a matter of fact, some quite elderly people have picked up new habits and skills. One of the writer's colleagues learned to fly an aeroplane at the age of sixty-four. We find old people in the Supreme Court of the United States, which indicates that intellectual competence does not seriously deteriorate. Therefore, there is no reason why a person should not undertake an adult education program if he feels the need for it. In addition to various activities designed for increasing personal efficiency which a person may undertake himself, he may, on occasion, take advantage of adult educational facilities to supply any skills or abilities that he lacks and to develop new interests which may stand him in good stead as he has increasing amounts of leisure.

Summary

Study habits and work skills constitute an important element in the personal efficiency of students at the higher academic levels. Some aspects of the work place are important. These include a well-ordered desk which one comes to associate with the work, an upright posture, adequate illumination and ventilation, and absence of visual and auditory distractions. Efficient use of time may be facilitated by preparing an actual time budget and by systematic planning ahead. There are indications that learning material just before going to sleep is more effective with rote than with logical material. Effective reading habits may include a quick preview, possibly to get in mind certain questions, stopping occasionally to think back over what has been read, making certain that one understands tables and graphs rather than following the temptation to skip them, and a more systematic review after the larger units have been read. Actual speed of reading may be increased somewhat by sheer effort, by inhibiting any tendencies to vocalize which may have been carried over from childhood, by attempting to speed up eye movements by directing attention to them, and by tachistostopic training to increase the span of perception. Effective note-taking requires adequate materials for the purpose. In lectures it is advisable to look for the main topics so that the notes may be put in outline form. They should be in the student's own words rather than copied *verbatim*. Much the same is true with reference to notes on books. Frequent review is desirable during academic courses and the earlier it can come after the initial experience with the material, the better from the standpoint of the process of forgetting. During an exam period or the actual examination, systematic planning of time is likewise important.

When the consideration of personal efficiency is extended beyond the academic field, the formation or breaking of habits may be facilitated by the basic principles of learning discussed earlier: these include repetition at a high level of attention with no exceptions permitted, and arranging that the desired performance will lead to satisfaction. Breaking a habit suddenly is more successful than a gradual procedure. It may be possible to substitute some other habit rather than make a complete break. It may help also to keep a record of progress and plot a curve. This procedure has some motivational value. Better control of attention may be attained by having an efficient work place or by forming certain habits such as a place habit, a time habit, or even a habit of sheer concentration, which may be developed by keeping an experimental record of one's lapses in attention.

It is in the field of methods of learning that the most "improvement" in memory can be achieved. This involves the basic principles of: allowing the material to organize, distributing the repetitions, learning in large units rather than piecemeal, motor reinforcement, occasional reproduction, and overlearning. Learning names in connection with faces may be facilitated by speaking the name on the occasion of introduction.

Emotional control may be promoted through the control of the bodily response, and, conversely, an emotion may be minimized by assuming the opposite bodily response. Emotions may also be conditioned, for example, by presenting the desired stimulus in connection with a pleasant situation so that the pleasure will be transferred to the stimulus itself. It may be feasible to build up an attitude contrary to an undesired emotion through auto-suggestion. Interests, like emotions, may be controlled somewhat through the appropriate bodily expression. Information about an object tends to bring an interest in it. Engaging in some activity in connection with a thing or institution will also foster appropriate interest therein.

The development of a good personality is important in many business and social situations. The problem may be considered as analogous to salesmanship with the emphasis on selling one's self. Some aspects of personality may be improved by the individual alone—for instance, appearance, facial expression, mannerisms, adequate social information about the amenities, vocabulary appropriate for the group in which one is to work, and even a background of information that may be useful in small talk. Items that must be practiced in a social situation include extroversion and conversational ability. It is well to study the prospects with a view to adapting oneself to them. This involves such considerations as their interests, recreational activities, and age. The degree of familiarity which it is desirable to show depends a good deal on the comparative age of the two parties and can be overdone. It is a good idea to plan initial contacts with a new person in advance. The actual selling mechanisms include suggestion, particularly indirect suggestion, emotional transfer which takes place when meeting a prospect for the first time in a pleasant situation, inflating the other person's ego indirectly by asking for advice or remembering his name, techniques for covering up *faux pas,* and a sense of humor. Finally, it is sensible to follow up the sale and maintain an experimental attitude toward the entire project.

One final contribution to personal efficiency comes from the adult education movement. This may supply skills and abilities that one did not have opportunity to develop previously as well as interests that may stand one in good stead with increasing leisure.

8

VOCATIONAL GUIDANCE

The School's Responsibility

THE EDUCATIONAL SYSTEM is broadly concerned with the adjustment of the individual to later life. It equips him with certain fundamental tools—speaking and writing to implement subsequent communication, and enough mathematics to enable him to get along in the economic scheme of things. It also provides him with a certain amount of culture—scientific information about the world around him and its people, something of their language and history, even some appreciation of music, literature, and art. The educational goal is broad so that the individual will be a better all-round person, will get more out of life, and even will become a better citizen. The importance of wider interests from the standpoint of general mental adjustment has been noted elsewhere.

The educational system also prepares people, to a greater or less degree, for specific vocations. Some secondary schools merely provide a basis for higher education, which has a vocational objective. On the other hand, many youngsters leave school at an early age, and it is a moot question whether they should receive specific vocational training in school. The technical or trade high schools assume this obligation unequivocally, whereas others dedicate themselves to a more over-all education. At the college level there is acrimonious debate as to whether one should enter, say, an engineering college or a college of commerce and specialize immediately on subjects aimed in specific directions, or whether one should enter a college of arts and get a broad general background before specializing. Many students even postpone their choice of a vocation until well along in their college career.

The importance of guidance. Even though the educational system does not always give direct vocational training, it may help at least in the selection of a vocational objective. All too often, vocational choices are fortuitous. The individual imitates some friend, a parent has a contact and gets him a job, or the parent actually imposes the ultimate objective. Perhaps the parent's judgment is based on some consideration of aptitudes and opportunities, but there are traumatic cases where the parent makes the decision in the light of his own disappointments and projects his desires onto the child. Teachers often are asked for vocational advice. Some schools have such personnel as school psychologists, who are equipped to do vocational guidance. Then there are outside agencies dedicated to these same objectives, such as welfare organizations, government employment services, veterans' facilities, and private practitioners. The contributions of psychology to education may be extended to include vocational guidance because it is a field in which the educational system has some responsibility.

People spend a good part of their lives working, frequently in a single occupation. If they happen to be in the wrong occupation, the lifelong consequences for the individual are pretty serious. If he has a job for which he does not have the aptitude, he is uninterested and finds it an up-hill struggle from the first. He may not even be effective enough to support himself. This inadequacy sets up an emotional undercurrent: he sees other people being more successful and develops an attitude of inferiority. He projects his difficulties onto someone else, and blames the foreman or the tools. He seeks other emotional outlets and may even become delinquent. If, on the other hand, he undertakes a vocation for which he is adapted, there is a considerable satisfaction in doing the job well, which carries over into his outside adjustment.

The frequency of unwise vocational choices may be noted in a general way by asking adults whether they are satisfied with their work. In connection with a public opinion survey, people were asked "if you could go back to the age of eighteen and start over again, would you choose a different career or vocation?"[1] Out of a considerable number who were interviewed, 41 per cent said "yes." Obviously a goodly number would have profited from some vocational guidance at the outset of their career. It is of further interest to note that professional people, in the same investigation, were better satisfied with their choices than were the others. Only 29 per cent of the professional people would choose a different career if they were starting again, as contrasted with 61 per cent of factory workers. It may be that in the case of the professional people, the initial decision was worked out more carefully and with more guidance, or it is possible that such occupations bring more satisfaction anyway. At any rate, it is clear that vocational guidance has far-reaching consequences in the individual's life adjustment.

---

[1] Anonymous, "Fortune Quarterly Survey," *Fortune*, January, 1938, 17, 86.

General Features of Vocational Guidance

Guidance *versus* selection. Two aspects of vocational psychology should be distinguished—guidance and selection. The former deals with one individual and many possible occupations; the latter, with one job and many applicants. The two fields, however, have a great deal in common: both attempt to match the characteristics of individuals—aptitude, proficiency, personality, experience, and interest—with the requirements of occupations. Vocational selection is somewhat further advanced than is vocational guidance. It is possible to take a given job and, without a tremendous amount of research, develop aptitude tests and other predictors on the basis of which to select people who have a high probability of success. To do this as scientifically in the case of guidance would require batteries of tests and predictors for a great number of jobs or occupational fields in order to determine the probable success of the individual in all these directions. Such a program would be prohibitive from the standpoint of the time required. Consequently, vocational guidance employs somewhat coarser predictors, deals with larger classes of occupations, and even uses some "hunches."

Self-guidance. Many clients come to a vocational counselor with the general request to "give me some tests and tell me what job I ought to go into." This is not the way it is done by the better counselor. He does not tell a client arbitrarily what to do, but rather helps him to reach a decision himself. To be sure, such devices as tests may be very pertinent, but they seldom focus the decision on a single job. Various potentialities and interests are revealed by the tests and come out in the course of the interview. Previous experiences are evaluated as of vocational significance. The client gradually develops some insight into his problems. The counselor provides facts and alternatives and helps narrow down the problem, but seldom tells the client flatly to concentrate on a particular field.

Negative *versus* positive guidance. Sometimes it is fully as important to guide a person away from a hopeless vocational objective as to guide him toward a favorable one. A person with considerable tremor in the hands could not be successful in surgery or watch making. One who is altogether lacking in mechanical aptitude as revealed by standard tests would do well to keep away from the machine shop. A person who does poorly in an intelligence test has the cards stacked against him if he aspires to a professional career. Such cases are fairly obvious, but often the solution is more obscure. When tests are used, it is desirable to have them validated empirically by comparing test scores with efficiency in a particular job. Sometimes, this empirical validity is not available and the counselor must resort to what is termed *a priori* validity, or *face* validity (it is obvious on the face of it), as in the assumption that a person of low mechanical aptitude would be unsuccessful in a mechanical job. An experienced vocational psychologist can make some decisions of this sort without too many mistakes, particularly in the negative aspect of guidance. A single handicap may be sufficient to indicate almost certain failure in a given job. On the other hand, a person might have aptitude for a job as revealed by tests or other predictors but still be destined to failure because of some other factor such as inadequate personality. The vocational counselor sometimes faces a difficult situation when it is necessary to give this negative kind of advice. One common practice is to point out tactfully the greater opportunities in some other type of work. Another is to suggest that although the person might succeed in this type of work, it would be only by dint of very great effort. It is analogous to advising a student of low intelligence who wants to go to college that he will have to put in more time studying if he hopes to pass. This negative aspect of guidance often involves the problem of breaking it gently.

Guidance not a single job. The client often requests a specific vocational recommendation. The pseudo-psychologist will give it to him. The scientific counselor, however, merely helps him narrow down the problem. For any individual, there is a considerable range of occupations in which he might be successful. If he ultimately hits one of these, the counselor has done his job well. Other considerations such as opportunities in those fields, length of time one wishes to spend in preparation, economic resources, geographical factors, contacts, and friends may implement the final decision between alternatives. Considerable flexibility is necessary anyway. Jobs change as time goes on. It was a standing joke among some of the people who were analyzing jobs and writing specifications during the war that if they left a place for a few weeks, on their return they found that a job that they had analyzed previously had become four different jobs. The counselor should keep abreast of changes. New industries develop with resulting new occupations. The whole field of electronics has developed from the simple transmitters and receivers of the early 1920's. The individual himself changes and may develop unsuspected interests or new skills so the initial vocational choice cannot be too hard and fast. Often, too, if some further preparation prior to undertaking the actual occupation is indicated, it is possible to work out a program which will be double-barreled. A student could pursue a curriculum much of which would be related to the ministry, Y.M.C.A. work, or teaching; or in a scientific field, he could prepare simultaneously for teaching or research by a program of study that was common to both objectives. In such instances there is the additional feature that the ultimate decision can be postponed until interest crystallizes further.

Aptitudes

Nature. Major considerations in a scientific approach to a vocational choice include aptitudes, personality, experience, interests, and opportunities. Aptitudes usually constitute the initial consideration. When an experienced person changes jobs, naturally, stress must be placed upon his work history. However, much vocational guidance deals with clients who have not held some previous major occupation. For youths just leaving school, it is more a question of potentialities than of previous work experiences. These potentialities are technically termed aptitudes or capacities (page 30) and are evaluated by aptitude tests or sometimes inferred from personal history obtained in the interview. They may be classified further as general and special: the former connotes that over-all aptitude usually termed intelligence; the latter includes a wide variety of things such as dexterity, coordination, ability to judge distances, memory for numbers, or ingenuity. It is on the basis of these aptitudes that the counselor often is able to estimate the probable success of the individual in certain vocations.

Basic principles. A fundamental point in vocational guidance as well as in vocational selection is that these potentialities of the individual must be matched with the requirements of the job. A certain occupation may require a person who can react quickly and has good coordination and high intelligence. Applicants for a job or counselees considering that job as a possible objective differ widely in coordination, reaction time, and intelligence. The problem then is to guide into that particular job people who have the necessary qualities. This raises the further question of how to determine what characteristics the job actually does require and whether the individual has those characteristics. Tests contribute to the latter determination, but the counselor must be sure that he has the right tests for a given case. This involves determining the validity of tests—whether the test measures what it is desired to predict. The procedure is perfectly straightforward: the job is analyzed as to its psychological characteristics in order to select tests which presumably measure those characteristics. If, for instance, a worker must pick up small things and put them together, it seems obvious that dexterity is required, and that a test of dexterity would be pertinent. The tests selected in this fashion are then given to workers on the job, and their test scores compared with actual proficiency on the job as indicated by their production or by supervisor's estimates. A correlation coefficient is computed showing the relationship between test and job. A number of tests are tried in this way; some are scrapped because of low correlation, and some are retained. These latter are then weighted by appropriate statistical methods, that is, each is multiplied by a constant number before they are added to constitute a total score. It can be shown that the properly weighted group of tests will have a higher correlation with performance on the job than would be the case if the scores were combined in any other manner. Finally, the test results are interpreted in terms of probability. If we know a person's score in the series of tests, it is possible to state his chances of success much as the insurance actuary predicts the chances of living a certain length of time. This principle of validating aptitude tests is very basic to vocational psychology. Unless we know to what extent and for what purposes our tests are valid, we are doing little better than the phrenologist who feels the bumps on the head, or the physiognomist who looks at the shape of the face.

Measurement of aptitudes. The distinction has been made between general and special aptitudes. The former, frequently termed intelligence, was discussed at length in Chapter 4, and intelligence tests were described. These included Binet tests, performance tests, and group tests. The distinction was also made between different types of intelligence tests—abstract, mechanical, and social.

Special aptitude tests likewise are useful in vocational psychology. A few of these will now be described.

One field in which a lot of special aptitude testing is done is that of *motor control.* The steadiness of the hand is tested by a metal plate with holes of different sizes in which the subject must hold a small needle point mounted on a handle without touching the edge for a designated number of seconds. Contacts with the plate are recorded electrically, and the smallest hole that can be negotiated gives some indication of steadiness. Typical tests of dexterity involve putting small pegs into holes as rapidly and accurately as possible or putting small washers on rods. Manipulation of larger objects is checked by placing and turning tests: a board containing some fifty circular holes an inch in diameter, arranged in rows, has circular blocks fitting loosely into the holes, and these blocks have to be removed, turned over, and replaced as rapidly as possible. A test of the larger musculature requires the subject to catch water flowing from the end of a moving pendulum in a very small-mouthed container. This requires coordination from the feet up.

Various tests in the *sensory* field are sometimes pertinent. Visual or auditory acuity can be measured by standard instruments. A widely used test of color blindness involves patterns made up of colored dots so arranged that there is, say, a large number "8" composed of red dots with green dots all around it. The "8" is perfectly obvious to the normal eye, but a color-blind person who confuses red and green cannot decipher the number at all. Speed of reading can be measured by tests comprising brief paragraphs in each of which there is one word wrong, which the subject has to locate. Obviously, the rapid reader can get more wrong words per unit of time than the slow reader.

Attention as an aptitude has several aspects. The range or the number of things to which one can attend simultaneously may be determined by a short-exposure device in which letters or numbers or words can be presented for a fraction of a second. It is possible to determine the maximum amount that a person can observe in this brief flash. The ability to work at a high level of concentration for a period of time may be sampled by tests of the cancellation type. With a page of miscellaneous numbers the subject crosses out every 2 and rings every 3 until he comes to a 7, then crosses 3 and rings 2 until he comes to the next 7, and so on.

A typical test for facility in *learning* is a code substitution test. At the top of the page there are nine digits with a symbol under each. The appropriate symbols must be put under each one of the numbers occurring on the rest of the page. The way a person speeds up in this performance indicates his learning capacity. Another learning test involves a simple maze made of sheet metal with grooves in it that the subject traces with a stylus while blindfolded.

Association, particularly its speed, is a characteristic that is often of vocational significance. The ability to give the opposites to a list of words is one common test, although this is usually put into the alternative-answer form such as:

Return is the opposite of: advance; surround; resolve; go.

Other widely used tests of this sort involve analogies such as:

Handle is to hammer as knob is to: tea; room; shut; door.

The subject underlines the alternative which is related to the third word as the second word is to the first. A variant of the analogies test requires that two words be supplied. One of the numbered words is to be selected for the first blank and one of the lettered words for the blank at the end of the sentence, as in the following:

.... is to water as eat is to ....
1. Continue 2. Drink 3. Foot 4. Drown
A. Restaurant B. Enemy C. Food D. Industry

Memory may be evaluated by various tests in which lists of words are presented at a standard rate and the subject is required to recall them in a standard fashion. A variation presents the words in pairs with the subject instructed to associate the two words of each pair together, and later, he is given the first word of the pair and required to reproduce the second.

Reaction time. The speed with which a stimulus gets through the visual or auditory mechanism and out to a muscle, is important in many jobs. It may be measured by some type of chronoscope which is essentially a constant-speed motor with a clutch operated electromagnetically to make a hand revolve in front of a dial. If the hand revolves once a second and the dial is graduated in 100 units, the time between the making and breaking of the clutch circuit may be read to 1/100 of a second. The circuit can be arranged so that when a light flashes, the hand starts, and when the subject operates a telegraph key, the hand stops. By reading the dial before and after, the reaction time can be noted. This procedure may be complicated to involve choice-reaction time by having several lights and several telegraph keys.

A test for *spatial perception* consists of pictures of a hand in unusual positions and the subject must decide whether each one is the right or the left hand. He has difficulty in doing this unless he can reorient the hand in space.

Reasoning tests involve items like the following:

John's birthday is after Harry's and Harry's birthday is after Tom's; therefore, Tom's birthday is before John's—True or False.

Speed of decision may be measured by a series of squares, each made up of fifty vowels, one of which predominates in frequency. The subject must tell at a glance which is the most frequent vowel.

Ingenuity may be evaluated by the old type of anagram in which words belonging to some category have the letters arranged in a random or alphabetical order, and the subject must discover the actual words. Ability to follow *directions* might be investigated by a set of complicated and somewhat confusing directions, such as:

Make a cross here ——— and a circle here ——— and cross out the second and third letters of the word peculiar. If you think that there was a war in 1944, put in a number to complete the sentence: a horse has ——— feet. If Tuesday comes after Monday make two crosses here ——— but if not make a circle here ———, and so forth.

Numerous other aptitude tests are available to the vocational psychologist, and there have been various efforts to make a systematic classification of them. Only one such will be mentioned—without any presumption that it is the last word.

1. Verbal. Defining, understanding and using words.
2. Numerical. Manipulating numbers as symbols and solving numerical problems.
3. Spatial. Solving problems involving objects and geometrical forms.
4. Memory for Details.
5. Drill. That is, ease and speed of routine memorizing.
6. Physical Ability. Coordination of large and small muscles and rapid and accurate manipulation.
7. Musical. Appreciation and Skill.
8. Artistic. Conception of form, balance, color harmony and use.
9. Social. Ability to work with people. Leadership.[2]

After all, the classification of aptitude tests is not very important in comparison with their validity.

Which aptitude test to use. The distinction was made between empirical validity and *a priori,* or face, validity. The former involves actually correlating test scores with proficiency on a job to determine if they are the right tests and if it is safe to use them for prediction. This procedure is widely used in vocational selection. Face validity, on the other hand, is based on an outright assumption. Obviously the empirical type of validity is preferable. To do a comprehensive job of vocational guidance by means of aptitude tests, it would be necessary to have valid tests for every vocation under consideration on the part of the client. Such a collection of tests simply does not exist. Some tests may be taken over from industry where they have already been validated, but this possibility is distinctly limited. The average industry validates tests for only a comparatively small number of its jobs, and the results may not be public anyway. Caution should be exercised, too, in directly taking over tests which have been standardized in industry and using them on school youths because possible variables due to age enter in. It has been found, for example, that certain types of coordination as measured by tests increase in effectiveness up to the age of eighteen, whereas certain tests of logical memory show little improvement beyond the age of thirteen.

---

[2] Kelley, T. L., *Interpretations of Educational Measurements,* pages 124–125. Yonkers: World Book Company, 1927.

An ideal program would not actually require norms for 20,000 different tests corresponding to the 20,000 jobs that have been surveyed. It is probable that a relatively small number of tests *weighted* differently for the different jobs would yield the necessary information, provided that the tests were relatively independent of each other. The theory underlying this point will be discussed in Chapter 16. Some day we may have a series of such tests which can be employed ubiquitously for vocational predictions. At present, the vocational counselor has access to a totally inadequate number of empirically validated aptitude tests.

Intelligence hierarchy. One instance which involves empirical validity is the relation of intelligence to general occupational level. This relationship was noted originally in World War I, corroborated in many *inter-bellum* studies, and more recently checked with intelligence test data obtained in the second war.[3] Some typical results with the AGCT tests used in the second war appear in Table 7. The soldiers were grouped according to the occupations that they held in civil life, and the intelligence of the groups was analyzed. A word of explanation is necessary about the nature of the scores presented. The tests yielded a raw score of a particular number of points but it proved more convenient in the Army to express these as standard scores so that the distribution of all the scores (*Cf.* Figure 1, page 34) has a mean or average of 100 and a standard deviation of 20. This transmutation does not affect the interpretation of the scores in the present case. The relation of σ to the normal frequency curve is important in some vocational problems (page 433).

The middle of the three columns in Table 7 gives the average standard score for the group indicated at the left. In order to give some notion of the spread of the scores the two other columns are provided. The first quartile is a score which is one fourth of the way up from the bottom of the distribution for that particular group of soldiers, and the third quartile is a similar distance down from the top. For example, of the accountants who were tested in the army sample, one fourth of them scored 121 or less, whereas another fourth scored 136 or better. Consideration of these quartile points gives some indication of the extent to which the different distributions overlap. If the first and third quartiles are close together, the individuals are bunched or have small variability. Data for each occupation are based on at least fifty cases and in many instances several thousand. The occupations are arranged in decreasing order of average intelligence and only a few are presented from a much larger table. The trend is obvious from professional, through business and clerical, down to skilled, and, finally, unskilled workers. It should be pointed out immediately, however, that the distributions overlap markedly even though their averages differ appreciably. For instance, the third quartile tool maker is a shade better than the average stenographer, and the first quartile carpenter is almost on a par with the average miner or lumberjack. This indicates the need for conservatism when using this intelligence hierarchy for practical purposes. One selective factor, which introduces a little error in the results presented, should be mentioned. Draft boards were under pressure to leave young men on the farm because food was so badly needed in wartime. The result was that many boards exempted such youths except when they were of such extremely low grade that they would not be much use on the farm anyway. This

---

[3] Stewart, N., "AGCT Scores of Army Personnel Grouped by Occupations," *Occupations*, 1947, 26, 1–37.

TABLE 7

Intelligence of Occupational Groups

Occupational Group	*First Quartile*	*Average*	*Third Quartile*
Accountant	121	129	136
Medical Student	120	127	135
Writer	123	126	133
Teacher	117	124	132
Lawyer	118	124	132
Auditor	112	124	132
Stenographer	115	122	130
Tabulating Machine Operator	111	120	127
Cashier	107	117	127
Production Manager	111	117	124
Salesman	107	115	125
Store Manager	104	115	124
Airplane and Engine Mechanic	102	114	123
Blueprinter or Photostat Operator	100	113	125
Tool Maker	101	112	123
Dental Laboratory Technician	94	110	121
Sales Clerk	95	109	119
Receiving or Shipping Checker	99	109	119
Airplane Engine Mechanic	94	108	120
Millwright	90	104	118
General Carpenter	86	101	113
Hoist Operator	83	98	109
Light Truck Driver	80	95	109
Laborer	76	93	108
Miner	75	87	103
Farm Worker	70	86	103
Lumberjack	70	85	100

practice tended to make the army sample of youngsters from the farm somewhat lower in intelligence than farm youngsters in general.

The principles back of this hierarchy of intelligence are clear enough. Each occupation evidently requires a certain minimum of intelligence. A person will, in the long run, tend to rise about as high in the occupational scale as his intelligence warrants. If he attempts a job that is too high in the scale, he finds it too exacting and leaves, voluntarily or involuntarily. If, on the other hand, he starts with one that is too low, he does not find it sufficiently interesting and challenging because it does not give an adequate outlet for his intellectual ability, so he may quit. Many, unfortunately, are unable to make such an adjustment and this fact contributes to the wide range of intelligence found for many jobs.

Various other investigations have corroborated this same hierarchy.[4] One such study classified the occupations into six broad groups in descending order of requisite intelligence: 1. High professional and executive, 2. Lower professional and large business occupations, 3. Technical, clerical, and supervisory occupations, 4. Trades and low-grade clerical jobs, 5. Semi-skilled occupations, 6. Unskilled. Another analysis revealed that the faculty of a large university was appreciably superior in average intelligence to the students, and these in turn were superior to the Army samples in the first war. Similarly, the alumni of a college were followed into their subsequent vocations, and a hierarchy of intelligence was found ranging through college teaching, secretarial work, business, social work, and physical education, toward the bottom of the hierarchy.[5] However, because of the overlapping of the distributions noted in Table 7, this hierarchy should not be used too rigorously for counseling purposes. Someone may be appreciably below the average intelligence of the members of a certain profession, but, nevertheless, by dint of hard work and good motivation, he stands some chance of success. The average tendencies are quite useful to the counselor in locating the individual somewhere near the appropriate level at which he might hope to succeed. In many instances the quartile scores are more helpful than the average scores in the hierarchy.

Minimum *versus* optimum intelligence. The preceding discussion emphasized minimal intelligence requirements for a given occupation. It is also possible for a person to have too much intelligence for a job. This does not mean that he would be unable to do the work, but that he would be dissatisfied. Many a bright person secures an unskilled job, finds it uninteresting, quits and tries something else a little higher up in the scale, and ultimately finds his level. Empirical studies have brought out this same point. In one large police force it was found that the patrolmen averaged higher in intelligence than did the lieutenants and sergeants who were officially superior to them. This did not seem right, but further study of the length of service indicated what really was happening. A good many bright young men entered the police force as patrolmen and after a time found that it was not sufficiently challenging to their intellectual capacity and dropped out. However, at the time that the study was made, quite a few of the brighter people were on the force, and raised the average for patrolmen. Those who were at about the right intelligence level for the work remained long enough to get promoted.[6] A study of clerical workers points in the same direction. The turnover was computed for a period of thirty months. The work was graded into five degrees of difficulty denoted by *A, B, C, D,* and *E,* with *A* the lowest grade of clerical work (opening mail) and *E* the highest type (private secretary). Two arbitrary ranges on the intelligence scale were selected, 80 points or less and 110 points or above. The percentages of turnover for the clerical workers in these two classes are shown in Table 8. It is to be noted that for the low-grade jobs *A* and *B,* the people of highest intelligence (last column) had the highest turnover—100 per cent. Obviously, they did not find the work sufficiently interesting and remunerative and therefore quit. On the other hand, the lowest-grade job, *A,* showed the greatest stability for the persons with low intelligence. The increasing turnover for low-

---

[4] Bingham, W. V., *Aptitudes and Aptitude Testing,* pages 44 ff. New York: Harper's, 1937.

[5] Hartson, L. D., "Intelligence and Scholarship of Occupational Groups," *Personnel Journal,* 1928, 7, 281–285.

TABLE 8

Turnover for Clerical Workers of High and Low Intelligence *

Grade of Work	*Per Cent Turnover for Intelligence Less Than 80 Points*	*Per Cent Turnover for Intelligence Over 110 Points*
A	37	100
B	62	100
C	50	72
D	58	53
E	66	41

* Bills

---

[6] Thurstone, L. L., "The Intelligence of Police," *Journal of Personnel Research,* 1922, 1, 64–74.

intelligence persons going up toward the high-grade job, *E,* represents incapacity rather than lack of interest.[7] Thus the vocational counselor should consider not merely whether the individual has enough intelligence for a proposed occupation, but whether he has too much.

Tests for groups of jobs. Although the counselor does not have access to an adequate series of empirically validated tests of special capacity, another possibility deserves mention—tests which have been validated for groups of occupations. For example, a considerable number of clerical jobs might be grouped, a sample taken of workers in all those jobs, estimates of ability in the jobs obtained, tests given to the workers and then validated on the entire sample in conventional manner. This yields a battery of tests for clerical workers in general. It would undoubtedly be better from a scientific standpoint to have separate tests for card-punch operators, coding clerks, private secretaries, bookkeeping machine operators, and transcriber and calculator operators. But the over-all tests would be better than none at all. A similar approach was made in connection with department store sales people. Obviously, they are selling many lines of goods and the work varies, but it was feasible to draw a sample from a wide range of sales departments and validate the tests, on this heterogeneous sample.[8] Valuable data along these lines were contributed by the Occupational Research Program of the United States Employment Service.

Face validity. It is unfortunate that the vocational counselor is so limited in the empirical validity of aptitude tests and is often compelled to employ face validity. There are tests which purport to measure clerical aptitude or mechanical aptitude, and some of the tests for dexterity and coordination are widely used by counselors. Even without empirical validation such tests, if interpreted with caution, may help one decide between clerical and mechanical work.

Job analysis. When tests to use on a face validity basis are selected, it may be desirable to refer to the results of job analysis. Such analysis will be discussed in more detail in a later chapter, but suffice it that skilled interviewers observe people at work, talk to them, and talk to supervisors, following a systematic schedule designed to ascertain what the worker does, conditions of work, hazards, tools, equipment, and the characteristics required on the part of the worker—both educational requirements and aptitudes. The schedule is of interest in the present connection, and in implementing this program, the interviewers often use a "Worker Characteristics Form." This includes such items as working rapidly for long periods, strength, dexterity, coordination, making estimates of size, quantity or speed, memory, social factors, tact, temperament, emotional stability. If a vocational counselor has access to such information about the various jobs under consideration, he may be able to find tests which presumably measure the characteristics indicated. It should be emphasized, however, that without empirical validity, predictions cannot be made in really scientific fashion.

---

[7] Bills, M. A., "Relation of Mental Alertness Test Score to Position and Permanency in Company," *Journal of Applied Psychology,* 1923, 7, 154–156.

[8] Stead, W. H. and Shartle, C. L., *Occupational Counseling Techniques,* pages 113–136. New York: American Book Company, 1940.

Aptitude as revealed by data other than tests. The counselor may often tap other sources of information about aptitudes in an interview and should be alert to these clues. To be sure, the high-school youngster has not had much industrial or professional experience, but there may be pertinent facts about what he has or has not been able to achieve outside of school, at summer camp, at home, or doing odd jobs. The counselor would scarcely need tests of aptitudes for field work in the profession of forest entomologist if the sixteen-year-old already had made the best collection of *lepidoptera* in town, nor would a test of engineering aptitude be necessary if the lad had failed his solid geometry although he worked at it harder than any other school subject. Even at the high-school level many an aptitude has flowered into observable accomplishment and reached the stage where tests are unnecessary in order to reveal it. An alert counselor will discover such indications of aptitude.

Personality

Aptitude not enough. Even though a person has the aptitude for a certain type of work, it may be insufficient to insure his success. Perhaps he is lazy, or careless, or reckless. He may have some little personal frustration and compensate for it by being overly aggressive and disagreeable. Therefore, the counselor must take some account of personality. Here, again, he is confronted with the same limitations as in the case of aptitudes—the lack of good, empirically validated tests. As a matter of fact, for many aspects of personality there are no tests at all.

Interviews. Some personality traits are reasonably obvious in an interview. Skilled personnel people and vocational counselors develop a certain facility in sizing up persons. They may even have certain types of questions that they ask in order to bring out certain characteristics. The manager of an insurance agency asks the prospective salesman how much insurance he thinks he can sell, as a rough indication of self-confidence. Incidentally, experiments have indicated that so-called objective traits—traits that yield some objective manifestation or product—

can be estimated more reliably than subjective ones, which leave nothing afterwards. Efficiency or originality might leave some tangible product which can be observed, whereas cooperativeness or cheerfulness would not do so.

Rating scales. There are situations in which the counselor may be able to secure systematic ratings made by people who are acquainted with the counselee. If the counselor is working in a school situation, he naturally asks some of the teachers about the student's initiative, tact, or social competence. Such judgments, however, are notoriously unreliable unless handled in some standard fashion. The most systematic procedure available is the use of rating scales. These will be discussed in detail in connection with rating employees, but the same technique may be used in a school situation or in securing estimates from acquaintances of the person who is receiving vocational advice.

The graphic rating scale is one of the most common types. For each trait a series of adjectives or phrases is scattered along a line representing the range of the trait, from low to high degree. The rater checks at some point along this line to indicate his estimate of the degree. The farther to the right the check-mark is made, the higher the estimate of the trait. For example, for the trait, "attitude," the line might be as follows:

Constrained and Formal	Slightly Reserved	Meets one half-way	Cordial and Informal	Extremely Breezy and Informal

The rater may check above a phrase or in between phrases. Subsequently, these ratings are converted into quantitative scores by measuring the distance of the check-mark from the left end of the line. It is possible for a counselor to work out a scale of this sort for any particular purpose. With a high-school population, for example, he might find certain traits which were especially pertinent to the careers that most of the students were contemplating. He could devise a rating scale including these traits for the teachers to mark. Details regarding construction and reliability of rating scales will be given in Chapter 17.

Tests. Psychological tests for the measurement of personality are much less satisfactory than are tests for the measurement of aptitudes. It is not so much a matter of gauging what a person actually *can* do on a test blank as in finding what he *will* do in certain circumstances. Many personality tests are of a subjective type in which the individual is asked to evaluate himself in certain hypothetical situations, or to indicate his attitude toward certain things, or to express his likes, or dislikes, or worries. One test, for instance, purports to measure ascendance-submission. It describes situations with several responses, one of which must be checked:

> If you arrive at a lecture or entertainment after the program has begun and find that people are standing, that there are plenty of seats available down front, and that you would be conspicuous going down there, do you take a front seat: habitually ——, occasionally ——, never ——.

Another test aims to measure extroversion-introversion. It involves "yes," "no," or "don't know," answers to questions such as:

> Does it make you uncomfortable to be different or unconventional?
> Do you daydream frequently?
> Have you ever crossed the street to avoid meeting some person?

Another test aims at the emotional aspect and presents groups of five items such as, "Disgust, fear, sex, suspicion, harm." The subject crosses out any of the five which he considers unpleasant and draws a circle around the one which is the most unpleasant. In groups like: "begging, swearing, stealing, flirting, spitting," he checks those he regards as blameworthy. With "injustice, noise, self-consciousness, discouragement, germs," the subject indicates which alternatives disturb him emotionally, or in "blossom: flame, flower, paralyzed, red, sew," he selects the alternative word most closely associated with "blossom." His choices are graded so as to indicate any emotional aberration.

The tests just described are subjective in the sense that the subject is called upon to evaluate himself. They are widely used in clinical procedure and, to some extent, in vocational guidance. It should be pointed out, however, that the tests are not effective unless the subject checks the items truthfully. This depends upon the attitude with which he takes the test. In an employment situation where he is trying to get a job and believes that the test has some relation to securing that job, he will be inclined to mark the test in the way which he thinks will be most favorable from the standpoint of his employment rather than as he actually feels. A prospective salesman answering the item about arriving late at a lecture would state that he always would go down front. He would mark the item thus because he thought the sales manager was looking for people who would show that degree of aggressiveness. In employment situations subjective personality tests of this sort are of very dubious value. In a vocational guidance situation it depends on what kind of rapport the counselor has with the subjects and whether they take the program seriously enough to indicate just how they feel about these items.

The psychologist is not unaware of the need for objective personality tests in which the person does not evaluate himself and in which he cannot figure out what is a desirable answer. Such tests are in the research stage, and some of them a little beyond. Allusion was made earlier (page 103) to tests for honesty and for self-control for children. It is technically difficult to frame adults in this way. With them a more indirect approach is necessary so that the subject's task is ostensibly different from the one that actually is scored. For measuring recklessness the subject is required to balance a rod on a metal plate on the floor so that when it is released it will remain in the air as long as possible before falling over and hitting a large hoop which surrounds it. Everything is recorded electrically, and while the subject thinks that he is being scored on the length of time the rod stays in the air, he actually is scored on the length of time he spends manipulating the rod before releasing it. Cautious subjects spend considerable time before the actual release. These objective tests will be especially useful in the vocational selection field where subjective tests are almost worthless.

Abilities and Experience

Educational background. Vocational guidance must always consider the individual's past experience. As mentioned above (page 201) some aspects of this experience may throw actual light on aptitudes. There are cases where abilities in school subjects are obviously related to the requirements of a proposed job. Many kinds of career, for example, require a certain amount of mathematics. The school grades may be available as an indirect check upon this experience. Otherwise the counselor may resort to achievement tests liks those described in Chapter 6. Then again, the general educational level may in itself be prognostic for a given line of work. If a person has completed a certain grade in school, he has been exposed to fractions and decimals. If he did not reach that grade, he would be handicapped in certain jobs unless he made some special study of those aspects of mathematics.

Dictionary of Occupational Titles. If the counselee has had previous work experience, this should be explored carefully. If he mentions some previous job with which the counselor is unfamiliar, the *Dictionary of Occupational Titles* will be helpful.[9] In this dictionary something over 21,000 jobs are defined. These jobs, moreover, are classified and assigned code numbers so that the book is useful in many personnel problems. Our interest in the *Dictionary* at the moment is as a means of providing information about the previous jobs held by the client. A portion of a typical definition will suffice to illustrate the type of entry found in the *Dictionary:*

---

[9] United States Department of Labor, *Dictionary of Occupational Titles* (2 volumes). Washington: Government Printing Office, 1939.

> PATTERN MAKER, METAL; Pattern Maker, Machine (Foundry) 5-17.010. Performs all machine operations on rough metal castings designed for use as metal patterns or core boxes such as milling, boring, drilling, grinding and lathe turning; performs all hand-finishing operations on castings by filing, filling in low spots with solder and sometimes painting the casting with aluminum paint.

This definition gives a fairly detailed notion of what the pattern maker does. It also gives some alternative titles, indicates the industry in which the job usually is found and provides a code number. The first digit in the code number indicates the major group—professional, clerical, service, agricultural, skilled work, semi-skilled, and unskilled. The other digits have further significance in the classification system, but are not important in the present discussion. This dictionary is widely used in employment interviewing, and has become a valuable aid to vocational counselors.

Job families. To make the most effective use of previous experience as prognostic of success in another type of related work, the counselor will often find that reference to job families is helpful. These consist of systematic tables of jobs, indicating their degree of relatedness. A table begins with a base job followed by a group of jobs which are very closely related to it and from which a person could be transferred to the base job with very little additional training. Next comes a group of jobs which are more remote so that the transfer would be more difficult and more training would be necessary. This is followed by still more remotely related groups. Job families have been worked out by the War Manpower Commission and also by the armed forces for military classification purposes.[10] They are developed by means of a complicated job analysis and sorting system which will be discussed in more detail in a later chapter (page 471). The analysis indicates the skills, knowledge, physical and mental characteristics, tools used, and materials worked upon. These are coded and punched into cards which are then sorted on the basis of the most important requirements for the base job, next most important, and so on. The family is built up step by step in this way. Excerpts from a typical family will serve as an illustration. If *tractor operator* is the base job, the group of most closely related jobs includes *blade-grader operator, bull-dozer operator,* and *farm mechanic,* all of which involve operation of tractors or machines like tractors. Next in line comes a group of jobs involving the operation of vehicles or vehicular mounted machines such as *Dunlap truck operator, road-roller operator, bus driver, scoop operator.* The next group involves the operation of construction machinery by means of levers and pedals, but not necessarily the operation of mobile machines. This includes *derrick-boat operator, caterpillar crane operator, dredge-lever man, crane-rigger,* and *portable loader.* In recruiting personnel for the job of tractor operator, one would look for people with experience in the first group. If they could not be found, then Dunlap truck operators and the like would be acceptable, and as a last resort, derrick-boat operators or others in that group would be better than people with no related vocational experience at all. When the tables are being used for vocational counseling, if the individual has had previous experience at a job which appears anywhere in the tables, it is possible to note how closely related that job is to the base job and infer how readily the individual might learn the base job, provided that he was successful in his old job. Still more useful to the counselor are some job families which have been constructed specifically so that they can be read in the reverse direction. The base job is the one in which the individual actually has experience. The subsequent groups indicate jobs in which he might find an adequate vocational outlet. Many such tables were devised to facilitate vocational adjustment at the time of demobilization. The base job is a military job, and the other jobs in the table are civilian jobs for which the military experience would be a good preparation.[11]

---

[10] United States Department of Labor, Division of Occupational Analysis, *Job Family Series.* Superintendent of Documents, Washington, D. C. (Miscellaneous pamphlets).

Trade tests. A counselor may have occasional use for trade tests in order to check on the actual status of a counselee in some particular trade. These tests are used primarily in employment situations where the individual's own statement about his proficiency cannot be trusted or where his journeyman's card may not really indicate anything except that he has put in a certain amount of time as an apprentice. It is only rarely that a counselor needs to check trade ability in this fashion. Trade tests will be discussed in more detail in connection with employment psychology (page 447).

Interests

Interest and ability. The starting point of a vocational interview is frequently some discussion of careers in which the client is interested. Other things being equal, interesting work is more pleasant and satisfying than work that is uninteresting. Actually there are indications of a relationship between interest and ability. When students arranged the courses in their curriculum in order of interest, and subsequently ranked those same courses as to what they considered to be their ability therein, the correlations averaged about .89. The results were less striking in another group where actual grades were used rather than the students' own estimates of their ability.[12] Expressed interests in a series of jobs were compared with the subject's location in the occupational intelligence hierarchy (page 197), and the correlation was .38. In a similar study, however, with different individuals the relationship was around .60.[13] The relation between interest and ability is not extremely close, but still appreciable.

---

[11] For further detail regarding occupations and job families see Shartle, Carroll L., *Occupational Information.* New York: Prentice-Hall, 1946.

Spurious interest. When a client expresses a vocational interest, one of the first considerations for the counselor is to decide whether that interest is genuine or adventitious. There are many spurious causes of vocational interest. A youth expresses an interest in a particular industrial job in New York City because he knows a girl in Brooklyn. He thinks banking would be a nice career because the sign on the door says, "Hours from 9 to 2." In many cases, also, the interest is a mere reflection of the social status of the job rather than of the satisfaction that might come from the work itself. Interest in the so-called "white collar" occupations is a serious problem for almost every vocational counselor in the larger cities. The discrepancy between interest in the white collar type of work and opportunities therein is serious. Some data bearing on this point may be noted in Table 9. These data were based

TABLE 9

Discrepancy Between Vocational Interest and Opportunity *

	Expressed Interest	*Opportunity*
Unskilled labor	0%	12%
Skilled labor	10	27
Business	29	45
Professions	61	16
	100%	100%

* Laird (after Madsen).

---

[12] Thorndike, E. L., "The Correlation between Interest and Ability in College Courses," *Psychological Review*, 1921, 28, 374–376.

[13] Fryer, D., "Interest and Ability in Educational Guidance," *Journal of Educational Research*, 1927, 16, 27–39.

on a sample of young people seeking vocational advice, and the frequencies of their choices were compared with the actual frequencies of the corresponding opportunities in the community where they were seeking a vocational adjustment.[14] It is to be noted that 61 per cent of them wished to engage in professional work, whereas only 16 per cent would be able to do so. On the other hand, none aspired to unskilled labor, whereas 12 per cent of them would have to be engaging in it eventually. The counselor has the problem of getting behind superficial interest due to social status or even more irrelevant factors, and dealing with the actual satisfaction in the work itself. He must be alert if a client comes in dissatisfied with his job and without an interest which he previously had. In many such cases the real answer is another maladjustment that is more fundamental: perhaps something has gone wrong at home and the dissatisfaction developing there simply manifests itself as a lack of interest in the job; or perhaps the difficulty lies in fellow-workers or the supervisor and not in the work itself. These mental maladjustments will be the subject of a later chapter, but the vocational counselor may encounter them and should recognize them. If he is properly equipped, he may clear up the cause of the maladjustment so that the vocational interest will return.

Some further difficulties with expressed vocational interests may be noted. Perhaps the individual thinks he would like a given type of work but never had any appreciable contact with it; or perhaps, he dislikes some job because what little contact he had with it was under unfortunate circumstances. He may have been a dramatic failure at selling tickets for a high-school play and thinks that he would never be successful in any kind of selling. Therefore, it is unwise for the counselor to stake too much on the expressed vocational interest, even though it is desirable to explore it.

Other evidence of interests. Some procedures for supplementary exploration were discussed before (page 92). Questioning the individual about some of his past activities may throw light on broad fields of interest. If it develops that he has engaged in avocational activities involving numerous contacts with people—attending social events, selling newspapers, holding offices in organizations—this would indicate some social interest. Similarly, if he has constructed things or has taken down an automobile motor, this points toward mechanical interest. Even the things he likes to read may give some indication. Information tests dealing with items pertaining to a particular field can indicate the degree of interest in that field.

---

[14] Laird, D. A., *How to Use Psychology in Business,* page 81. New York: McGraw-Hill, 1936.

Interest inventory. The most widely used method for evaluating interest is the interest inventory. It comprises several hundred items which the subject checks as to whether he likes, or dislikes, or has no preference regarding them. Scoring patterns for various vocational interests have been derived as described earlier (page 93). In conventional notation a grade of *A* in the inventory represents the score made by the highest 75 per cent of the particular interest group, *B* represents the next highest 25 per cent, and *C* represents scores which lie outside those made by the group in question. Scoring patterns of this sort are available for forty-odd vocations, but they are almost all for the professional vocations, which, after all, involve a small portion of the people who work for a living.

It is cumbersome to administer an interest inventory and score it for a large number of occupations, although the work may be facilitated by punched-card machine scoring. The procedure could be shortened if some fundamental interests were common to a group of occupations. Such commonalities actually have been found and have been exploited. For example, the advertising copy writer, the newspaper reporter, and the English teacher might all have a good deal in common. First, every pattern was correlated with all the others to determine the extent to which those who ranked high in advertising interest also ranked high in English-teaching interest. The technique of factor analysis was then applied in order to analyze all these intercorrelations with a view to determining whether the whole array would be accounted for by certain basic factors. It might be, for example, that interest in people ran through a lot of the patterns, whereas interest in a specific thing like advertising might involve a certain amount of business interest, a different amount of interest in people, and so forth. The technique explores this possibility of basic factors in a purely abstract mathematical fashion at the outset, but results in a number of factors and the weight or loading for each of those factors in each of the vocational interest patterns. Once these loadings were known, the next step was to speculate on the nature of the underlying factors by noting the occupations in which the heavy loadings occurred. In one such study the first factor had high loadings for Chemistry, Engineering, Psychology, Architecture, and Farming, but low ones for Accountant, Ministry, Purchasing Agent, and negative ones for Advertising, Life Insurance and Real Estate Salesmen. Hence the first factor seemed to be interest in Science. The second one, by a similar method of analysis, appeared to be an interest in language, the third, an interest in people, and the fourth an interest in business.[15] Thus any of the interest patterns revealed by the test consisted primarily of different amounts of the four basic interests in science, people, language, and business. Chemistry involved considerable interest in science, little in people or business, and some in language. It would be possible, also, to revise the test and build it more directly about these basic factors.

Another investigation collected data for 3,500 students and scored them for 80 interest patterns. Analysis resulted in eight clusters of interests, and a new inventory was devised centering around these eight. Thus, it was possible to score the blank according to those eight group patterns of interest rather than the all too numerous individual ones.[16] The eight basic factors or clusters are:

1. Commercial Interest as found in Advertiser, Salesman, Banker, Manufacturer, Retail Merchant.
2. Legal Interest as in Judge, Lawyer, Congressman, Diplomatic Service, Banker, Tax Expert.
3. Athletic Factor as in Athletic Director, Cattle Rancher, Explorer, Forest Ranger, Radio Announcer.
4. Academic Factor as in Historian, Librarian, Mathematician.
5. Descriptive Factor which indicates a general interest in people and things, such as Actor, Advertiser, Artist, Journalist, Musician, Reporter, Press Agent, Psychologist.
6. Biological Factor found mainly in Biologists, Chemists, Dentists, Geologists, Scientists.
7. Physical Science factor as found in Architects, Building Contractors.
8. Art Factor—There were not sufficient cases in the data to make certain identity of this.

Permanence of vocational interest. It was indicated earlier that vocational interests are often due to fortuitous circumstances and it is probable that the interests will change when the fortuitous circumstances are removed. This transitory character of interests is borne out to some extent in empirical results. College women ranked vocations in order of preference and repeated the procedure a year later. The correlations ranged from –.11 to .86 and averaged around .50. Although some of the women had fairly permanent vocational interests, others revealed the reverse tendency. Greater permanence was found when interest patterns like those developed in Strong's blank rather than a direct expression of vocational interest were used. College seniors were ranked as to degree of interest in twenty-three vocations as revealed by the inventory. Five years later the procedure was repeated. The correlations between the two series ranged from .59 to .84 and averaged .75.[17] This may be compared with the average correlation of .50 found in the previous study of expressed vocational interest. The inventory results obviously are more stable and thus more useful to the vocational counselor.

---

[15] Thurstone, L. L., "A Multiple Factor Study of Vocational Interest," *Personnel Journal,* 1931, 10, 198–205.

[16] Thurstone, L. L., Unpublished Paper Read at the Meeting of the American Psychological Association, September, 1935, on "Factorial Analysis of Vocational Interest." Described in Bingham, W. V., *Aptitudes and Aptitude Testing,* page 77. New York: Harper's, 1940.

The interest inventory sometimes reveals an unsuspected interest. The pattern may be there, but the vocation has not occurred to the individual as a possible outlet, because he has never heard much about it or has had no contact with it. A youngster enrolled in a course in dairy technology largely because he came from a farm, and his parents thought it would be a nice thing for him to do. He was not particularly interested in the work and became worried about his ultimate objective. The interest inventory indicated Class A with reference to sales interest. Salesmanship as a career had never occurred to him. However, he was encouraged to look into it and try a minor selling project. To make a long story short, he eventually had a successful career as a salesman for dairy equipment. He evidently had the basic factors that make for interest in selling and was able to capitalize on the technical training he had received in dairy technology. Thus, a very satisfactory vocational adjustment was made as a result of discovering this unsuspected interest.

Information about jobs with a view to determining interest. If there are indications of vocational interest in a field where the individual has had no experience and about which he knows very little, it is desirable to furnish some information about, or provide some contacts with, the vocation in order to see whether his interest will crystallize. One obvious solution is to try the job in a small way. Another is to have representatives from various industries tell the students something about the opportunities and the different kinds of work in their industries. Field trips to factories and various institutions serve the same function, and much can be accomplished through reading. A vocational guidance center should have a library available in which clients may read descriptions of jobs and secure information about opportunities. The United States Department of Labor has been publishing since 1936 a series of job descriptions[18] which are useful for such a library. Books on occupations are available, and technical journals such as *Occupations* frequently carry descriptions of this sort. The *Dictionary of Occupational Titles* may be mentioned again in this connection, although the descriptions are meager from the standpoint of a complete picture of what is involved in the job. If a person can secure information about the nature of the work, possible lines of promotion, working conditions, whether it involves travel, or dirt, or hazards, and probable income, he has at least a start in the direction of deciding whether it is something which might interest him.

---

[17] Strong, E. K., "Permanence of Vocational Interest," *Journal of Educational Psychology*, 1934, 25, 337–344.

[18] *Monthly Labor Review*, Washington, D. C.: Government Printing Office.

Opportunities for Employment

Overcrowding. The final major consideration in making a vocational choice is the actual opportunities for securing employment. Some fields are overcrowded. There may always be room for a few at the top, but unless there is good reason to believe that the individual is outstanding, he must face the probability of severe competition for the few openings. Therefore, it is desirable to have such information about the probable opportunities, as is illustrated below. Colleges of Education prepare teachers for the secondary or elementary schools and have detailed records as to the number of graduates who are placed. They publish, from time to time, an analysis of trends from one of which some excerpts are given in Table 10. It shows, for instance, that of teachers of Fine Arts in 1936, 87 per cent were placed at an early date, whereas by 1940 this percentage had dropped to 57. Evidently, the ratio of supply to demand was increasing. On the other hand, the opportunities in Chemistry compared to the number of people available showed a definite increase during this period.[19] Tables of this sort provide information about probable oppor-

TABLE 10

Percentages of the Graduates During Five Years That Secured Teaching Positions Before December 31 of the Year of Graduation **

Subject	*1936*	*1937*	*1938*	*1939*	*1940*
Biology	60%	56%	45%	56%	50%
Chemistry	58	78	48	71	71
Commercial Education	93*	90*	77*	77*	78
Elementary Education	94	90	99	96	98
English	49	60	64	53	52
Fine Arts	87	86	62	51	57

* All of those who could teach shorthand and typing were placed.
** Anderson

---

[19] Anderson, E. W., "Teaching Opportunities of 1940," *Educational Research Bulletin*, 1941, 20, 37–41.

tunities for those who are wondering in which field of teaching it is advisable to specialize. In connection with this overcrowding of some fields, mention should be made again of the discrepancy between interest and opportunity with reference to the white collar occupations.

Opportunities to advance. In addition to the general opportunity to get a job at all, the vocational counselor should also give some consideration to opportunities for advancement. Some positions are definitely blind alleys, and the client should take such a position with his eyes open. As a matter of fact, a blind-alley occupation is all right for some people who may be happier without much responsibility. Those in the upper intelligence levels, however, are usually dissatisfied. Another point is how long a period of training on the job is necessary before one can hope to be up-graded. In certain trades the length of apprenticeship is an important consideration.

Employment trends. It is desirable for the counselor to be cognizant of current employment trends. The need for personnel in some jobs changes as time goes on because of market conditions. An extreme instance occurs during a war when the manufacture of munitions and aircraft creates a tremendous demand for workers in those industries with a corresponding retrenchment in consumer goods industries. It is difficult to keep completely abreast of these trends, but the Bureau of Labor Statistics, for example, provides frequent information. The United States Employment Service is continually gathering data, both on a national and a local basis, and the vocational counselor may be able to get access to the results. It is still more important for the counselor to watch employment trends in his own region because most of his clients want employment near home. It is probable that in the years to come there will be more systematic publication of employment data for the benefit of schools and private vocational counselors. An excellent example of a community effort to keep abreast of employment trends is the work of the Occupational Planning Committee of the Welfare Federation in Cuyahoga County (centering around Cleveland, Ohio). Various local organizations such as service clubs, veteran's groups, and labor organizations volunteered personnel or funds. About 1,000 people participated in some aspects of the work. The occupational inventory covered all places with more than eight workers, and took a 5 per cent sample of all smaller places in the county. The approximately 10,000 jobs were combined into 210 fields in each of which the sub-jobs were similar in duties, materials, equipment, and worker characteristics. The plans are to conduct an inventory of this sort annually to secure a fair picture of employment trends. The information is useful to the local counselors because it shows which fields are overcrowded. The inventory has other uses besides vocational guidance—indicating to a business that contemplates expansion whether there are enough of a certain kind of workers available in the community, giving schools information about technical training that they should offer to a greater or less extent, and indicating to unions where shortages exist and apprentice training courses should be set up.[20]

Special Aids for Guidance

Preliminary orientation forms. It helps the vocational counselor if his client gives some systematic consideration to the problem in advance of the interview. This may be implemented by a blank which calls for a little self-evaluation and incidentally draws attention to important factors involved in a vocational choice. One such form is termed the "Occupational Orientation Inquiry." An introduction states that four important items in vocational choice are knowledge, interest, ability, and opportunity. The client is then asked to check a list of over 200 possible vocations on a simple four-point rating scale, as follows:

Knowledge of the job:
  4. Have been regularly employed in the job.
  3. Worked part-time or helped in the job.
  2. Have general knowledge of the job but no knowledge of details.
  1. Less than average knowledge.
Interest in the job:
  4. Would enjoy it as a life work.
  3. Could develop sufficient interest to enjoy it.
  2. Indifferent.
  1. Would do it as a last resort.
Ability in the job:
  4. Think I have exceptional ability in the field.
  3. Could be successful.
  2. Would be able to do average work.
  1. Would find it difficult to work in the field.
Opportunity for placement:
  4. Practically assured of a job.
  3. Have a contact.
  2. Know people in the field whom I might be able to contact.
  1. No existing contacts.

The counselor may find it profitable to scrutinize these ratings and note particularly any discrepancies and irregularities which need discussion.[21] For example, if the student has checked a high interest in a particular type of work, but knows little about it, is not sure that he has ability, and if he has no contacts which might help to get a job, the question arises as to just why he is so interested. It may develop that the interest is casual. Moreover, the blank serves to start the client himself thinking seriously about the vocational possibilities. Too frequently, the counselee comes in with the general attitude, "Here I am. What shall I do?" A blank such as this throws the problem back in his lap, gets him doing some preliminary thinking, and forms a good basis for the ultimate situation in which the counselor does not dictate but merely helps him arrive at his own choice.

---

[20] *The Reporter.* Cleveland: Occupational Planning Committee of the Welfare Federation, December 10, 1946 (mimeographed).

[21] Wallar, G. A., "A Practical Aid to Occupational Orientation," *Journal of Applied Psychology,* 1941, 25, 535–557.

Profiles. Another aid for guidance counselors is graphic representation of results of tests or other predictors. Figure 8 shows contrasting profiles for two individuals who have taken a series of tests. The heavy vertical line in the middle of each profile represents the mean or average test score, and the bars extending right or left indicate deviation of the individual's test score from the mean, with those at the left being below the mean and those at the right above the mean. The distance right or left is scaled in terms of standard deviation or σ. For example, individual *A* in intelligence is almost two sigma below the average, whereas individual *B* is about one and one-half sigma above the average. For further convenience in interpretation the percentile scale is given at the bottom of the profile. For example, a person one sigma above the average is at the 84 percentile. Such a diagram makes small deviations from the mean inconspicuous and highlights the larger deviations, thus focusing

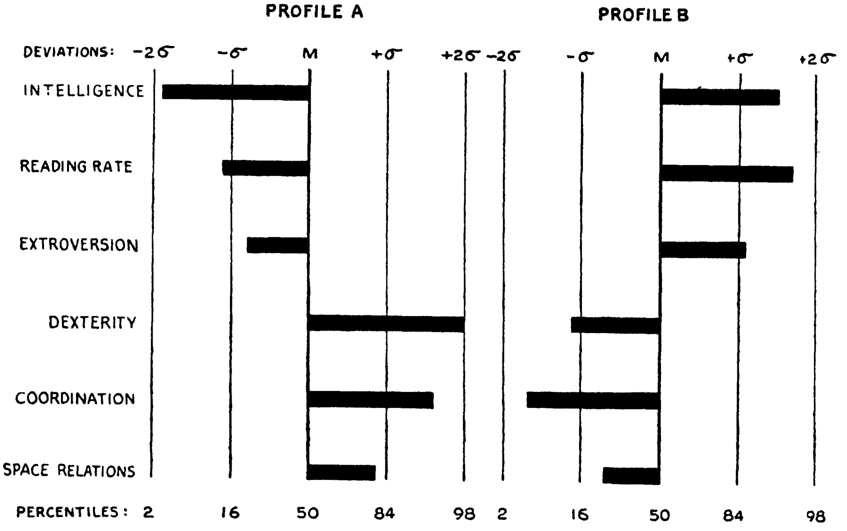


Figure 8. Test Profiles of Two Persons.

the attention of the counselor upon them. In the profile shown, individual *A* is unusually low in intelligence and considerably below the average in reading rate and extroversion. On the other hand, he ranks very high in dexterity and appreciably above average in both coordination and spatial relations. Individual *B* seems to be good where *A* was poor and *vice versa.* If these individuals were being counseled with reference to such contrasting careers as business executive and skilled machinist, it would seem plausible to guide *B* in the executive direction and *A* in the other, assuming, necessarily, that these tests have some face validity. This profile technique makes it possible to note marked deviations and then draw conclusions as to their bearing on vocational choice.

Vocational Guidance Outside School

The school system is not the only place in which vocational counseling functions. Government employment services have a major responsibility of classifying applicants and filing their cases pending requests from employers, but they often do a modicum of vocational guidance. Many out-of-school youth come in seeking employment with little background of experience so that aptitudes must be considered. At the close of the second war, the military organizations themselves did some vocational guidance at their separation centers. But demobilization became a stampede and there were neither facilities, time, nor qualified personnel to handle the millions of men involved. Moreover, vocational guidance is not a thing which happens once and is done, but is a continuing process which covers a period of self-discovery. In order to implement this more extended program the Veterans Administration established advisement centers for the benefit of those who missed the opportunities for vocational counseling when they were discharged or who subsequently felt a need for further vocational information and guidance. Some of the larger colleges have a vocational guidance unit in connection with their student personnel program. There are also private practitioners, many of whom are competent to do a thorough job of vocational guidance for a reasonable fee.

Incidental mention should be made of the fact that an occasional agency gives utterly unsound guidance. Some correspondence schools which seek prospects to enroll in their courses for a fee are not very discriminating as to who enrolls from the standpoint of the prognosis for that individual in the proposed vocation. The prospect is asked to copy a cartoon in order to determine whether he has any artistic talent and would profit from a course in that line. Although the writer has had no first-hand experience with this, he does have suspicions that some atrocious sketches lead to encouragement. In one actual study of unemployed people who had previously taken correspondence courses, some disquieting things were uncovered.[22] Forty per cent of them had dropped out before a year was over and 60 per cent did not stay over fifteen months. Moreover, 29 per cent never engaged in any job that had the same name as the course they took. Worst of all, many individual cases were found in which the individual had attempted a course which was distinctly beyond his ability. Almost a fourth of those who had taken correspondence courses in accounting had less educational ability, as revealed by achievement tests, than did the average seventh-grade pupil. Obviously, the cards were stacked against these prospective accountants until they could remedy their educational disability, if it could be remedied, and the expenditure of their time and money was definitely wasted. The correspondence school should have assumed some responsibility in determining whether they had any aptitude at all for this specialized type of work before it took their money. Probably some of their shortcomings were obvious in their correspondence regarding application for the course.

Then there are the fraudulent and incompetent practitioners. A self-styled vocational counselor near the writer's campus advised a man whose intelligence score, based on Freshman norms, was 4 percentile to do graduate work toward a Ph.D. in clinical psychology.

Educational Guidance

Vocational guidance often leads to educational guidance. If the individual develops a certain vocational objective, it may be desirable to plan his education toward that objective. If he decides to become a physician, obviously a pre-medical program must be planned. Educational guidance deals with such questions as where the subsequent education is to be secured, and what type of curriculum is to be followed. In many instances, the vocational counselor is also an educational counselor.

Results of Guidance

It is a moot question as to just how effective vocational guidance techniques are. There are not enough people who have received systematic scientific guidance and then gone out in the world for a long enough period of time to demonstrate the effectiveness of that guidance. Strictly speaking, we need information about a person's success both with and without the guidance. This kind of information is, of course, impossible to secure. It is like the evaluation of medical treatment: if the patient is given certain medication and recovers, it is assumed that the medication did the trick, but there is always a possibility that the recovery occurred in spite of the medication. By the same token, it is possible that some people succeed in life in spite of vocational guidance.

---

[22] Bird, C. and Paterson, D. G., "Commercial Correspondence Courses in Occupational Adjustment of Men," *Minnesota Employment Stabilization Research Institute,* 1934, 2, No. 7.

The best that can be done is to compare the success of people who received vocational guidance and followed the recommendations with the success of others who did not follow the recommendations. Even here it is difficult to evaluate the success, particularly when we are dealing with a wide variety of jobs. Eighty-one clients were followed up five years after they had been advised on the basis of a battery of tests. Some had accepted the recommendations and some had not. The follow-up involved an interview to determine whether they were placed satisfactorily, unsatisfactorily, or whether the result was indeterminate. It is to be noted in Table 11 that 53 per cent of the group followed the recommendations and 51 out of that 53 were satisfactorily placed. For those who ignored the recommendation, successes and failures occurred with equal frequency. The significant point is that a large proportion of those who followed the recommendation apparently was successful.[23]

TABLE 11

Accuracy of Vocational Prediction *

	Failure	*Success*
Followed recommendation	2	51
Ignored recommendation	14	14
Impossible to judge success or failure	18	

* Webster

Another follow-up was made of some 639 young people who had received vocational guidance in the British Institute for Industrial Psychology. They were interviewed five or more years later and were classified as to whether their adjustment was successful or unsuccessful. It developed that successful adjustments for those who had followed the recommendation were 15 times as frequent as failure, whereas successful adjustments for the cases who had not followed the recommendation were only twice as frequent as failure.[24]

---

[23] Webster, E. G., "A Follow-Up of Vocational Guidance," *Journal of Applied Psychology,* 1942, 26, 285–295.

Some New York City school children were given vocational tests in 1921 and were followed up eight years later. The earnings of a group of clerks were correlated with a clerical intelligence test which they had taken eight years previously. The result was a coefficient of .60. A similar correlation between earnings and previous mechanical aptitude tests for mechanical workers was only .10.[25] But an unduly heterogeneous set of jobs was lumped together to constitute the "mechanical workers" which may partially account for the small correlation. Vocational tests have improved greatly since 1921, so the results are not too disquieting, and the recent follow-up studies are much more encouraging.

Summary

The educational system is concerned in a general way with the student's adjustment to later life of which an important aspect is vocational. Statistics reveal that many persons are dissatisfied with their jobs. Guidance should be distinguished from selection in that the former deals with one individual and many jobs, and the latter with one job and many applicants. Vocational guidance is not a matter of telling the client arbitrarily what to do but rather of helping him to make his own decision. Guidance sometimes has a negative aspect—advising a client away from a certain job.

Aptitudes are a basic consideration, particularly for the vocational guidance of persons who have not already had substantial work experience. It is necessary to match the aptitudes of the individual with the requirements of the job. Aptitudes may be divided into general and special; the former include what is generally termed intelligence, and the latter involves such things as motor control, coordination, dexterity, sensory capacity, attention, learning, association, memory, space perception, ingenuity, reasoning, and ability to follow directions. Deciding which test to use in a given vocational problem depends on the validity of the test. *A priori,* or face, validity consists merely of a shrewd guess whether the aptitudes revealed by the test actually are related to the requirements of the job. Empirical validity is much more desirable and involves correlating test scores with ability on the job as it is revealed by production or by supervisor's ratings. Tests already validated in industry must be used with some caution, and the number of such tests available is limited.

---

[24] Anonymous, "A Follow-up of Vocational Advice Cases," *Human Factor,* 1937, 11, 16–26.

[25] Thorndike, E. L., *Prediction of Vocational Success,* pages 65–66. New York: Commonwealth Fund Division of Publication, 1934.

The relation of intelligence to the general occupational level is of some interest to the vocational counselor. It is found that professional people average highest in intelligence, followed by business, clerical, skilled, and unskilled workers. This hierarchy will enable the counselor to locate the individual somewhere near the approximate level at which he might hope to succeed. It is not only a question of enough intelligence for a job but sometimes of too much. A person of high intelligence in a low-grade job may be dissatisfied. Information about aptitudes may also be inferred from items in the personal history—hobbies, odd-jobs, or school performance.

Information about aptitudes is not enough, because personality is equally important in many kinds of work. It is more difficult to evaluate this aspect. Some personality traits can be evaluated in an interview, and systematic rating scales for other traits may be devised to be executed by people familiar with the client. Some personality tests are of the subjective type, that is, they require the subject to evaluate himself. These are of questionable value in employment situations and are somewhat doubtful in a vocational counseling situation unless it is certain that the subject will cooperate. Objective tests of personality are still in the research stage and involve ingenious devices in which the subject cannot determine just how the test is to be scored and hence cannot fabricate favorable answers.

The abilities, educational background, and previous experience of the client may be important in his guidance. The *Dictionary of Occupational Titles* is helpful in discovering the nature of previous and proposed jobs. Job families make it possible to determine whether jobs are closely enough related so that a person can transfer without too much retraining.

Interest in one's work makes for better vocational adjustment. Many vocational interests, however, are due to accidental factors. The counselor may get behind these spurious interests by questioning the client about his previous activities, by use of information tests, and by interest inventories. Scoring patterns of the inventories have been devised for different occupational interests. These patterns actually are based on a few fundamental kinds of interests—interest in science, language, people, and business. Greater permanence is found in vocational interests as revealed by inventories than in vocational interests expressly stated. Sometimes an unsuspected interest will be discovered by means of such an inventory.

The vocational counselor must be familiar with opportunities for employment and advancement. Guiding a client into a field which is already overcrowded is inadvisable, unless the individual seems to have outstanding ability. It is necessary to keep abreast of employment trends. One special device which the counselor may find useful is some kind of a preliminary orientation form which the client fills out before the interview. This may require him to rate certain jobs with reference to his knowledge of them, interest in them, presumed ability in them, and his opportunities for making connections in them. Such a form incites him to think about some of the problems before the interview. Another useful devise is the graphic profile which may show the results of tests and other factors in a readily understandable form. It should be noted that other agencies beyond the school—government agencies and private practitioners—do some vocational guidance. Some private practitioners unfortunately are at times unscientific and unscrupulous. Vocational guidance often leads directly to educational guidance in which the program of study leading to the vocational objective is planned. There are some statistical indications that persons receiving systematic guidance and following it succeed more frequently than those who do not.

9

PSYCHOLOGY IN GENERAL MEDICAL PRACTICE

General Considerations

THE FIELD OF medicine is another professional field to which psychology makes some contribution. The most obvious connection lies in the broad field of mental health or mental disorder. Mental cases range all the way from the violent phase of manic depressive psychosis requiring hospitalization in a padded room down to the almost trivial instances of worry or frustration that walk into the office of a psychology instructor.

Many cases require the services of a physician especially equipped in the psychopathological field. Difficulties which involve no organic element are often helped by the psychologist operating in some counseling capacity. The ordinary medical practitioner often encounters patients whose trouble is primarily mental, and just like such other professional people as teachers and social workers, he should be sufficiently familiar with mental aberrations to recognize when something is wrong and, if he is not capable of handling that type of case, to seek expert advice on it. Many physicians consciously apply psychological principles in dealing with their patients. Others employ them as part of the common sense psychology that almost anyone uses after a fashion. It appears worth while in this chapter to bring together some of these principles and examine them systematically. Actual mental maladjustments will be considered in later chapters.

Whole patient. The physician is not dealing with an isolated set of symptoms or secretions but with a whole individual. A pain in the back may sometimes be explained by an X-ray plate and sometimes by an unwillingness to work. Psychology itself is becoming increasingly aware of this totality of the person. It used to study sensations, perception, reactions, feeling, emotion, and desires, more or less as isolated entities which could be put together to constitute an individual. More recently psychology has come to recognize that the whole is more than the sum of its parts and that the different elements interact to such an extent that they must be considered as a totality. It is somewhat the same story for the physician and patient. The doctor may set the fractured radius or treat the disordered stomach, but the patient has in addition, pains, worries, frustrations, and hopes. Control of attitudes about the ailment is sometimes almost as important as control of the organic aspect.

Mind and body. A moot question for the philosophers is the actual relation between the mind and the body. Metaphysics is beyond the scope of the present discussion, but it is necessary at any rate, to reckon with a certain degree of practical relationship between mind and body. If telling a person something changes his mental attitude so that his digestion is improved, that cold pragmatic fact must be recognized regardless of the underlying mechanisms which mediated the result. Worry spoils the appetite. Persons faint at a gruesome sight, and the fainting is obviously mediated by vascular changes in the brain. An insistent toothache profoundly affects one's disposition and emotional attitude. In some organic ailments the mere desire to live is an important element in aiding recovery. The removal of fear that the disease will be fatal will often facilitate progress. Thus, the physician, since the days of Hippocrates, has found that controlling emotions and attitudes is part of his job.

Psychosomatic medicine. This study of the psychological concomitants of physical illness has more recently been termed "psychosomatic medicine." Certain mental, and particularly emotional, conditions appear to precipitate physical symptoms. Reports from the war indicated that gastric ulcers were brought on by the violent emotions experienced in combat, or in awaiting periodic bombing of the city, or even by general prolonged worry. Such symptoms have also resulted from less traumatic situations. A person who is frustrated by his environment finds that illness gives some reassurance of security and that people apparently take more interest in him. The most acceptable excuse for incapacity is physical illness. Ulcers develop particularly with people who have a driving ambition toward prestige or wealth, and often the symptoms first appear after some dramatic frustration of prestige values—such as being thwarted by one's boss. Psychotherapy, particularly along lines of emotional control, has been applied experimentally to ulcer cases, and there was a higher incidence of recovery than in the case of a control group which did not have the psychotherapy. Other physical ailments sometimes result from emotional disturbances. Anxiety features are quite prominent in asthma. Some allergists state that a considerable proportion of their cases have an allergy which is psychogenic, and some of them even have a person skilled in psychotherapy collaborate with them.

Physical ailments, on occasion, can precipitate mental difficulties and personality changes. A person whose activity or diet is greatly restricted for medical reasons may develop tendencies toward introversion. Some chronic cardiac cases were found to have abnormal fears and daydreams. The pulmonary tuberculosis patient sometimes overcompensates for his natural fear of the disease by becoming euphoric and finding life abnormally sweet. The causative relationships in such cases are not too well established scientifically, but the concomitance of the mental and physical is directing considerable attention to the psychosomatic aspect.

Family as well as patient. The physician often has to treat the members of the family as well as the patient. Many times, parents are in more of a dither about a tonsillectomy than the child, possibly because they know more about what might happen. On occasions when there is little more to be done except to await developments, it often reduces parental anxiety if they can administer some harmless medicine at regular intervals. The procedure provides some relief from emotional tension and is essentially a *placebo* for the parent. This all adds up to the fact that some of a physician's effectiveness in his ordinary practice involves psychological principles.

The Setting for Medical Work

Unpleasant suggestion. The actual situation in which medical treatment takes place is important. A significant psychological element in the medical office is suggestion. This involves presenting an idea so vividly that it leads to action. The salesman actually proffers the order blank and the fountain pen with the cap removed, and the prospect gets the idea and signs inadvertently. Under hypnosis, the suggestion that the chair is a bicycle leads to the appropriate response. By the same token, if someone gets the idea that he is sick, he acts accordingly. A number of people connived to tell a particular individual that he looked sick, and this weight of suggestion was sufficient to produce obvious nausea.

Knowing that the room one enters is a medical office entails an appreciable degree of suggestion. A notion that something is wrong is stronger for a patient in the waiting room than it is for the same man striding down the fairway. If the ailment is one that may require some disagreeable treatment, he is set for discomfort. The patient who kills time by running his tongue around a dental cavity feels that the worst is yet to come.

In a professional building there may be unpleasant sources of suggestion in the odors or sounds from other offices. Before the advent of intravenous anaesthetic, the odor permeating the halls and waiting rooms was enough to put any patient into an unfavorable attitude. Then hearing other patients make sounds that indicate that they are in pain, is an unsettling experience. Aside from feeling pain one's self, there is no more vivid way of considering it than to hear somebody else yelling. The arrangement of a medical suite is important from this standpoint. If several rooms are available, the best arrangement is to have the room in which painful treatment is administered the most remote from the waiting room. Soundproof construction of the building helps.

Another source of suggestion is the conduct of other patients in the waiting room. Some of them talk luridly about their ailments, past or present, and some may be in pain and broadcasting the fact. It is desirable, if possible, to get such patients away from the others in order to minimize unfortunate suggestion. A frequent device is for the nurse, or even the physician himself, to take such a suggestion-spreader into a separate room in order to get ready for examination. This does not help the patient in question but it does help the rest of the group from the standpoint of suggestion.

Favorable suggestion. Positively, it is possible to promote more favorable suggestion. Much depends upon the receptionist or nurse. An acceptable personality and a cheerful, pleasant manner go a long way. This individual serves as a sort of morale officer. Aside from over-all cheerfulness, she is on the alert for persons who need special attention. If someone is obviously a little more upset than the others, a pleasant word or additional encouragement is directed toward that person.

Even the furniture is important. If it is desired to minimize a particular emotional state, the thing to do is assume the opposite bodily response. Muscular tension is a frequent accompaniment of fear and worry, and relaxation will tend to change this emotional condition. This relaxation can be facilitated by comfortable furniture. Even the things that patients see as they look about the room can contribute to a calmer frame of mind. If the room is attractively arranged with adequate lighting and has a subtle pleasantness about it, this atmosphere colors the patients' attitudes.

Occupying attention. When patients are waiting, their attitude depends considerably on what they are doing during that period. If their attention can be engaged by some outside object, they will be less preoccupied with themselves. One obvious distractor is reading matter, particularly reading matter that has a high attention value. A worried person cannot concentrate on a treatise on philosophy or even a thought-provoking article on the state of the world. On the other hand, everyone likes to look at pictures, and this requires little effort. Pictures are insistent from the standpoint of catching attention, as every advertiser knows. Therefore, illustrated magazines in the waiting room are a must. Some question might be raised about the presence of semi-popular medical magazines on the table. Although they give an idea of professional competence, if the patient happens to find something in the magazine that resembles his own case, then he worries about it all the more and develops attitudes which may subsequently handicap the treatment. A student once walked into the writer's office with a copy of a technical psychological journal opened to a description of a case of schizophrenia. The student wondered if he had it. From that point on, it was difficult to help the student in working out the solution of a comparatively minor problem of mental maladjustment.

Other distractors include the toys in the pediatrist's office or the aquarium that appeals to all ages. Fish and other *fauna* do interesting things, and, furthermore, moving stimuli are effective from the standpoint of attention. Birds serve to occupy attention, and so may a location with an interesting view from the window. Unfortunately, many urban waiting rooms look out on an air shaft or do not look out at all. The writer still remembers a medical waiting room where he often sat in childhood overlooking a medium-sized river with a certain amount of river traffic and an interesting landscape on the far bank. A rather inadequate substitute for a good view is attractive pictures on the wall.

Professional atmosphere. In some medical offices the general atmosphere carries a certain professional overtone. Exhibits of a scientific nature help in this respect, provided they do not lead the patient's thoughts to his own case. For example, there are simple exhibits in which one can press a button and observe a few X-ray pictures. If these pictures are of a type which will not be personalized by the patient, they may serve to arouse interest and create a bit of professional atmosphere, but still have no unfortunate suggestion. An array of equipment in the inner office may impress a patient as to the physician's professional competence. Surgical instruments are not as desirable as an array of electrical devices with knobs and dials, special lamps, and sterilizing equipment. If some of these exhibits make it possible for the patient to learn a few scientific facts, he may pass along his favorable impression to his friends. Many persons like to display fragmentary scientific knowledge, and would enjoy telling somebody else about an X-ray picture they saw at Dr. So-and-so's office. The satisfaction resulting from this process would tend to transfer slightly to a favorable attitude toward the office and toward the physician.

The Physician Himself

Appearance. The patient's attitude is influenced appreciably by the general impression that the physician creates by his appearance. It is obviously desirable for the doctor to look clean and sanitary. Some patients are very concerned about bacteria or other infectious agents, and the simple expedient of a white coat inspires confidence about the absence of such organisms. Some of the ordinary professional trappings serve much the same purpose. A stethoscope sticking out of the pocket or hanging around the neck is a sort of badge of office that carries some favorable suggestion in many cases. It makes an additional contribution to the self-confidence of persons just beginning a medical career.

Cheerfulness of manner. The physician realizes that much depends on his manner when he is talking to the patient, and it almost goes without saying that a cheerful attitude is preferable. The underlying principle is imitation. If the physician smiles, the patient is inclined to do so too; and develop the corresponding feelings. Even if the physician is really worried about the patient, he conceals it so that the patient will not worry too. Deliberately cultivating a pleasant, cheerful attitude through control of bodily expression contributes much to the so-called "bedside manner."

When working on the patient. A word of caution is in order about the physician's general manner when he is actually doing something to the patient—dressing a wound or making some minor operation which is, or could be, discomforting. The writer recalls a dentist who used to grit his teeth when he began to drill. The suggestion in that situation was inescapable. It was a very natural inference that gritting the teeth indicated that he was working hard and thus was applying the drill vigorously, therefore, it must be painful. The writer also knew a physician who said "Ouch" when he was removing a dressing which tore the skin a little. It was said with a humorous inflection and was supposed to imply that the operation was trivial. However, in this instance, the timing was wrong, and the "Ouch!" stimulus was given just before the actual yank. The patient was pre-disposed for trouble in this way and naturally found it. It is much better for the physician to be relaxed and not appear to be working hard.

General Conduct During Examinations

Distractions at crucial moments. It is a good idea to provide something to distract the attention at a crucial moment. There are inevitably occasions which are painful—when a hypodermic needle is being inserted or when adhesive tape is being pulled off. Experiences, including painful ones, are heightened by the degree of attention devoted to them; and the more attention that is devoted to one thing, the less attention is devoted to other things. The sleight of hand performer utilizes this principle of misdirecting attention: he displays a piece of cloth with a flourish to show that it is empty, and knocks a glass of water from the table with his flourish. Everybody watches the glass and never notices the magician taking a bowl of goldfish from his vest and putting it under the cloth. In similar fashion, distracting the patient's attention at a potentially painful moment will minimize the pain. Physicians do not go so far as to kick the patient in the shins at the same time that the needle is stuck in his arm, but many of them do introduce a few interesting words about something else, a pleasant remark, or the last sentence of a joke at the crucial moment. It is frequent practice to get the patient to do something else—say something, or take a deep breath, or hold his breath, or grip something in one hand. A somewhat similar situation exists in the dental field with reference to removal of tension. When a dental impression is being made, it is desirable for the patient to bite naturally, but many become self-conscious and overly anxious and bite too vigorously. Dentists often contrive to distract the attention at just this moment and then quietly tell the patient to bite. Some practitioners find it helpful to have a "line" of possible distractions which can be used on occasion.

Rapidity of diagnosis. An intelligent patient is sometimes worried because of the rapidity with which the diagnosis is made. There are, of course, many times when the diagnosis is obvious, almost at a glance—if there has been a high incidence of a particular kind of case in the community and this person shows all the symptoms. However, if the physician merely listens to a few words, takes the temperature, and immediately diagnoses and starts prescribing, some people wonder if he really can figure it out so rapidly, which tends to weaken their confidence in him. When the diagnosis is obvious, some men play around with a few other diagnostic devices—things which will corroborate the original diagnosis, but really are not necessary. From the standpoint of the patient's attitude toward the physician and his confidence in him through the years, this extra business is worth while. An opthalmologist, for example, who was examining a case that involved nothing but refractive errors requiring correction, very quickly reached the point where he was writing a prescription for glasses. The patient, who was a scientist himself, expressed alarm, whereupon the physician went back and showed how he had double-checked his readings. The patient was not only satisfied, but consulted that opthalmologist for the rest of his life.

Giving technical information. Sometimes it helps create a favorable attitude if the patient is allowed to get a little technical insight into some aspects of the case. He may be allowed to stand by during some bit of chemical analysis while the analyst explains what they are looking for in the test tube, or he may be allowed to look through the microscope. This gives the patient confidence in the scientific character of the diagnosis. One obstetrician found it helpful to put long tubes on a stethoscope so the patient could listen to fetal heart beats.

Special Attitudes on the Part of the Patient

Attitude toward severity of ailment. Patients differ widely in their attitudes toward their difficulties, particularly those attitudes which they may carry over into a social situation. Some persons on the road to recovery derive pleasure from realizing that their ailment was really very serious. They make a play for sympathy from friends by discussing this seriousness. Again, in discussing operations, a group of people rival one another in trying to recount the worst operation. Another type of patient derives no morbid satisfaction from the seriousness as such but is pleased because he was lucky enough to survive something that was so bad. He likes to point out that almost everyone gave up but that he came through in spite of it. Thus, with some patients, the physician's natural tendency to minimize the seriousness of the difficulty is not favorably received. If the physician detects such an attitude on the part of the patient it may not be amiss to give him a few selling points which he can use upon his friends after everything is over.

Transference of attitude. A difficulty which sometimes arises in the relationship between patient and physician is one that often occurs similarly in cases which come to the clinical psychologist, namely, a transference of attitude. A common one is a father fixation, in which the physician or the counselor is accepted in a parental role. This may reach the point where it becomes embarrassing or, at least, makes rapport of the right sort between the two parties difficult. It is easy to see how this mechanism may develop. Illness may be associated with punishment and, as a child, the individual was often punished by the father. Therefore, it is not a very remote transition to think of the physician in the parental role. This transference may reach the point where considerable personal attachment is involved: the patient may come to the office needlessly on various minor excuses; and also may get a certain emotional release from sharing intimate secrets with the physician—secrets which the patient would not share with friends. This tendency is quite common in psychoanalysis where the patient will reach the stage of dreaming about the analyst. If the patient can be given some insight into the mechanism of fixation, it is possible ultimately to develop a negative transfer. In ordinary practice, the presence of a nurse at examinations or consultation interviews is helpful.

Adjustment to individual differences. In medicine, as in many other fields where we are dealing with people, individual differences loom large. A good practitioner is alert to these differences and governs himself accordingly. Some patients are perfectly satisfied if they are told what to do and it works. Others want all the details. They differ too in the extent to which they give necessary information for diagnosis. Some tell the main symptoms and others tell everything along with a lot of irrelevant material. Actually talking about difficulties, particularly if there is a mental adjustment aspect, provides a certain relief to the patient and in itself has therapeutic value. The whole notion of individual differences and adjustment to them is basic here just as in many other phases of applied psychology.

Deliberate Use of Suggestion

Direct. There are many instances in medical practice where suggestion is a legitimate and necessary therapeutic measure. This is especially true with mental health problems but even in ordinary practice there are cases where the mere idea of recovery contributes to favorable progress. Suggestion is largely a matter of building up a particular idea and keeping it vividly before the individual until it leads to the corresponding action. The constructive use of direct suggestion in medical practice is essentially a matter of building up the idea that one is getting better. To that end, it is entirely legitimate to administer inert pills or a potion that has psychological rather than chemical value. Laymen may look askance at such a practice, but from the scientific standpoint it is entirely sound. If sugar pills coupled with verbal suggestion clear up the difficulty which would not improve in a reasonable time without such help, it certainly is worth three dollars. Similar suggestion from relatives or others would not be effective. Actually, paying for the suggestion enhances its power.

The effectiveness of direct suggestion can be shown experimentally. An interesting demonstration was made with a group of medical students.

One of them was skeptical about this whole matter which had been discussed in class. The instructor connived with a number of students who knew the skeptic intimately to apply some direct suggestion to him. When he arose the next morning, his roommate looked at him rather sharply, remarked that he didn't look so well, and asked him how he felt. On the way out to breakfast, he met another member of the class who said he looked kind of yellow, and how did he feel. In the next hour or so, several other students went through much the same routine. Finally, when he reached his class and sat down in the front row, the instructor entered, stopped in surprised fashion, gave him a long look, and suggested that he had better omit the class today and go outside. By this time things had reached the point where he actually *had* to go outside.

Indirect suggestion is more effective than direct in many situations. If an advertiser tells a person directly to stop and buy the product, many a prospect will determine to make his own decision and actually will resist the suggestion. However, if the advertiser shows him a distinctive looking person using the product or presents it in an attractive atmosphere, the prospect gets the idea without the arousal of opposition. In the same way, some patients will resent the direct suggestion that they are getting better. If they still have some discomfort, they think that the physician is kidding them. In such instances it is possible to plant the idea indirectly without arousing this opposition. A common practice of this sort is to let the patient accidentally overhear the suggestive statement. The physician talks to one of the relatives in the next room in a voice that ostensibly is lowered but is actually loud enough for the patient to hear. The relative is told perhaps that the patient looks better and probably will be up and around in a few days. This indirect suggestion is planted without the usual opposition, because the patient thinks he is not supposed to hear it.

An experiment was carried out by a clergyman who had a parish at the same time that he was pursuing graduate work in clinical psychology. He was interested in suggestive therapeutics as it is encountered in the course of ministerial practice. He selected twelve parishioners who were ill but not dangerously so. He planned to visit them daily for a week. On the first three visits he was to apply morose suggestions by praying with them as he would do with one who was about to die—looking forward to the future life and looking back on the accomplishments of this one. The last three visits were to embody the opposite type of suggestion —benevolent, sympathetic, and cheerful. However, it was impossible to carry out the experiment as originally designed. The very first night he received telephone calls from four of the subjects urging him to come to them immediately. One wanted to confess her sins, another to have communion in preparation for death, and two wanted comfort to reduce their anxiety about death. Three more were worse the next day when he visited them. On the second night there were two more emergency calls. The unfavorable suggestion, of course, was discontinued, the opposite type applied, and the improvement was almost immediate.[1] This experiment did show quite clearly the effect of indirect suggestion in a situation where there was good rapport as in the clergyman-parishioner relationship. Incidentally, it indicates the responsibility of the clergyman in so far as he may sometimes dabble in therapeutic work.

Auto-suggestion. There are occasional therapeutic possibilities in auto-suggestion—where the patient gives himself the suggestion. This technique has been successful in minor mental maladjustments. The use of auto-suggestion in medical practice might take the form of getting the patient to act as though he were better and happier. Encouraging him to get up after an illness or an operation and to get around as soon as possible may help morale, and his own behavior may suggest to himself that he is making good progress. A somewhat abortive instance of auto-suggestion was the Coué movement some years ago. This was started by a French practitioner who handled some cases by suggestive therapeutics and supplemented it by a ritual which involved auto-suggestion. The ritual consisted of repeating over and over the little jingle, "Every day, in every way, I'm getting better and better and better." Unfortunately, however, the matter received considerable publicity, and persons with all kinds of ailments were going around repeating this jingle to themselves in the forlorn hope that it might help them. This brings out a fundamental point regarding any cult or therapeutic movement—treatment without diagnosis flies in the face of science.

Psychology and Preventive Medicine

Normal procrastination. The medical profession makes commendable efforts to promote a program of prevention as well as to provide therapeutic service. In some parts of the world people pay a fee to be kept well instead of paying to secure medical assistance only when something is wrong. The nearest approach to this method that we have is the practice, followed by some farsighted persons, of having periodic health examinations. These are organized sometimes through an employer or other agency. A larger program of this sort requires education of the public. A definite handicap to any such trend is the normal procrastination of most people. It is very tempting, when we feel well, to put off any medical considerations until the evil day when something hits us. A survey was made of fifty adults as to the reason for their last visit to the dentist. Forty-four per cent of them made the visit because of actual trouble such as pain or a cavity rather than doing it as a matter of periodic checkup to see if there was any undiscovered trouble.[2] The 44 per cent were, in a sense, procrastinators. Again, interviews were conducted with 878 people who needed treatment for a chronic disease which had been diagnosed but who had failed to seek treatment within a year after diagnosis. Twenty-six per cent explained their delay on the grounds that the ailment was not serious and 49 per cent explained their delay on the grounds that the physician could not help them.[3] These explanations in many instances were rationalizations of the mere inertia against any pronounced changes in regimen.

---

[1] Saleste, P. H., *The Religious Aspect of Suggestive Therapeutics.* Ph.D. Dissertation, Ohio State University Library, 1925

A factor that contributes to procrastination is the tendency to forget unpleasant things unless they are forced upon us. When we look back over a time, it is the more pleasant things which are usually recalled, except in the case of rather dramatic incidents. Therefore symptoms are forgotten temporarily unless they are very insistent. Another factor is the common tendency to believe that the difficulty will not hit one personally. It is much like the average attitude toward accidents. The industrial worker is told to wear his goggles when working on the grinding machine, but he has to do a brief job, feels that nothing will happen to him, and anyway he is careful. No one, when he starts off in his automobile, anticipates an accident. So with reference to health, we know that people become ill but we do not believe that it will be us. This leads to further procrastination.

Selling problems. In the face of this difficulty, the installation of a preventive medicine program involves a certain amount of selling to overcome inertia. A cue may be taken from the people who advertise and sell products that are conducive to health—antiseptics, vitamins, toothpaste, and therapeutic lamps. A motive that is very frequently used in this connection is fear. A person is frightened into buying a safety appliance by being shown the unfortunate consequences of not having the appliance. Tire chains are sold almost universally by this appeal to fear. Toothpaste is marketed by pictures of people suffering toothache, allegedly because they did not use this particular dentifrice. This is one of the cases where a negative approach is satisfactory in selling. Many times it is unwise to present something that a person is not to do, because he is thus given the idea of doing it—for example, telling him not to open a package until Christmas. On the other hand, the negative kind of appeal involved in the illustration is satisfactory because the situation presented is, under no circumstances, pleasant. A picture of a person with a toothache or skin infection would not induce one to go out and get a toothache or ringworm; it might, on the contrary, lead him to do something to prevent such an eventuality. There are possibilities for preventive medicine in showing the unfortunate consequences of failing to adopt prophylactic measures.

---

[2] Crane, G. W., *Psychology Applied*, page 562. Chicago: Northwestern University Press, 1938.

[3] Lombard, H. L., "Education as a Major Need in Adequate Medical Care," *Journal of American Medical Association*, 1938, 3, No. 19, 1747–1749.

Commercial advertising. Some actual contributions to preventive medicine are made, perhaps unwittingly, by people who are attempting to sell some product in the health field or are attempting to create good will. The advertising slogan, "A clean tooth never decays," has probably done more to promote oral hygiene than almost any other single effort. The advertiser was interested primarily in selling toothpaste, but he did influence public attitudes. A radio program for many years included the admonition "See your dentist twice a year." This may have been included as a gesture toward the dental profession but nevertheless did arouse considerable interest in prophylaxis. Advertising of vitamins may have led some people to correct deficiencies in their diet.

Selling One's Self to a Community

A physician setting up a practice has the problem of developing a standing in the community so that an adequate number of people employ his services. This is largely a matter of selling himself and his services to the community. The physician is not unique in this respect—many other professional men have the same problem. Some of the points made in the chapter on personal efficiency are pertinent in this connection.

Impression of maturity. One consideration for a person just out of medical school and beginning his career is the impression of maturity that he creates. It was noted earlier that some patients regard a physician somewhat as they would their father, that is, an older person in whom they have confidence. It is often difficult for a youngster to achieve this status. Dressing conservatively and avoiding too youthful a manner may help a little in this direction, although it is unfortunate to stifle youthful enthusiasm and good nature. On the other hand, there are some patients who look with favor on a younger person on the general grounds that he is sure to be up to date. Things are moving rapidly in the medical profession, and unless the older man keeps up on technical journals and the like, he may actually miss some techniques which would increase the accuracy of his diagnosis and the effectiveness of his therapy. With so much stress on late models in household appliances and automobiles, it is natural that some people should desire the very latest thing even in medical practitioners. This situation necessitates a happy medium and, if possible, some adaptation to individual patients.

Personality. Very frequently personality does more to bring a patient to a particular office than does the technical skill of its occupant. If a person finds a contact with somebody pleasant, he is inclined to return for more. There is a basic tendency to seek to continue pleasant experiences and discontinue unpleasant ones. If someone has a reasonably agreeable experience in the medical office resulting from the personal contact with the physician and also from the general setting, he is apt to return on occasion.

Status in the community. Any professional man may get increased professional opportunities if he becomes favorably known in the community for non-professional reasons. Sometimes a wise choice of friends which enhances him socially may enhance his professional acceptance also. Legitimate publicity for some other accomplishment, perhaps in the field of civic or social work, may get his name before the public so that occasionally someone will think of him when they need professional help. Large business concerns take their public relations seriously and have a department devoted entirely to it. Even educational institutions do this to some extent. Occasionally, a professional person achieves quite a bit of status through some hobby. A dentist who is expert in *legerdemain* is quite well known because of informal performances. This certainly has not at all decreased his professional practice.

If a professional man is planning a program to sell himself to the community, he can take a cue from the procedure followed in commercial enterprises where a good deal of stress is laid upon consumer analysis. This means attempting to find in advance what people need and want and what aspect of the product they like (see Chapter 22). In the present case this may involve studying the interests of the community so that one may pursue similar interests. One may even find it profitable to become proficient in their language. The physician may study his possible clientele and adapt his extracurricular activities to them to develop a better standing in the community.

Summary

The most obvious contribution of psychology to medicine is in the field of mental disorder, but some psychological principles are of concern to the ordinary medical practitioner. He is treating the whole individual rather than isolated symptoms, and there is a tendency for mental and physical conditions to interact in a practical way regardless of the underlying metaphysical explanation. Psychosomatic medicine recognizes this relationship.

In the medical office the mechanism of suggestion is operative. The idea that one is ill or is going to suffer discomfort accentuates the experience. Suggestive odors and sounds made by other patients are minimized by the arrangement of waiting and treatment rooms. Favorable suggestion on the other hand is promoted by a skillful receptionist. Even comfortable furniture reduces tension and its resulting emotional conditions. Devices for occupying attention while patients are waiting slightly decrease the unfortunate suggestions they might otherwise get. Interesting reading matter replete with pictures, toys for the children, aquaria, and even a view from the window may help. In some instances a professional atmosphere is suggested by some display of scientific equipment. This should be done, however, in such a way that the patient will not personalize it and think all the more about his own difficulties.

The appearance, manner, and personality of the physician himself are important. A cheerful manner is often imitated by the patient who will accordingly feel more cheerful himself. When he is actually working on the patient, the physician should not appear to be working too vigorously. When he is examining a patient, it is sensible for him to provide distraction at a crucial moment when something painful is done. Too rapid a diagnosis sometimes weakens confidence even though the rapid diagnosis is well founded. Some patients react favorably to more scientific information than is usually given. Patients differ, also, in their attitude toward the severity of an ailment. Some enjoy amplifying the severity in retrospect, and it will not hurt to give them facts which they can use in this way. A frequent difficulty is a transference of attitude toward the physician himself as in the familiar father-fixation. This can be minimized by the presence of a third party when feasible.

Direct suggestion often helps in therapy. The notion that one is improving has a salutary effect. Sometimes direct suggestion arouses opposition so that it is better to approach the matter indirectly. In some instances even auto-suggestion has been effective.

Preventive medicine has some psychological implications. There is a normal tendency to procrastinate so that some selling is necessary. Fear is a frequent and effective sales motive.

A final consideration for the physician, particularly at the outset of his career, is selling himself to a community. The most important consideration, perhaps, is personality, and it may be modified along the lines suggested in an earlier chapter. His general status in the community in a non-professional way may contribute to the physician's professional standing.

10

NATURE AND DIAGNOSIS OF MENTAL DISORDERS

We will now turn to disorders which are more distinctly mental in nature than the bodily ailments last discussed. To be sure, the line is sometimes difficult to draw, but there is an appreciable difference between an abnormal fear of cats, belligerent behavior, and delusions of persecution on the one hand, and tuberculosis, appendicitis, and sarcoma on the other. The former come more within the purview of the psychologist, although they sometimes require the assistance of a medically trained person. These two professional groups, are working together to an increasing degree. At one time, there was some misunderstanding between the psychiatrist with his M.D. and the clinical psychologist with his Ph.D. This has largely disappeared. In the recent war the load of mental cases was much greater than the regular medical officers could carry and clinical psychologists worked side by side with them.

The psychologist, of course, is very careful not to treat physical ailments. The present chapter is concerned with such problems of mental adjustment as the psychologist encounters. These mental disorders sometimes are due to physical causes like a head wound, a toxin in the system, or bad heredity, and at other times they are produced by a nagging relative, social failure, extreme jealousy, religious worries, or lovers' quarrels. They are not limited either to the cases that pass through the physician's office, where something is sufficiently wrong so that the individual seeks medical advice. Mental adjustment problems are encountered in the home, the school, the court, the church, and the factory. The present chapter will discuss the diagnostic techniques which the clinical psychologist employs and then note some of the things which are found by these techniques, with a view to giving an over-all notion of the scope of mental disorders.

The Diagnostic Interview

Preparation for the interview. It is almost universal practice to interview the client in approaching mental adjustment problems. This means more than merely sitting down and talking with him. There are special techniques for conducting the interview and a trained psychologist gains much valuable information from observing the client during the interview, quite apart from what is said. Also, many significant and diagnostic bits of behavior can be observed while the client is taking psychological tests.

The psychologist undertaking a clinical interview should not start cold: preliminary information should be secured. Many psychological clinics have a routine practice of making the appointment with the client and then sending him certain forms which he must execute and mail in before the interview. In a typical clinic three such forms are used. One is a statement of referral which includes a description of the client's main problem and some information about the rest of his family. Another blank calls for a medical examination, presumably by the family physician, including the general physical condition, abnormalities of growth or development of functions, and anything else that the physician thinks might be significant for the mental adjustment problem. The third blank requests information from the school the child has attended (if the client is a child) including the quality of academic work and general conduct in school, noting especially any unusual things that the child does. The interviewer, having access to this material, will save time which otherwise would be spent in securing some of this information.

Rapport. An important initial consideration in almost any type of psychological interview is what is termed "rapport." This deals with the mutual attitude existing between the interviewer and the client. The term was first used by psychologists in connection with hypnotic techniques. If *A* hypnotizes *B,* then *B* will take suggestions from *A* and do what he says, but if *C* attempts to give these suggestions they are ineffective. The reason for this is that *B* has rapport with *A* and he will cooperate with him, but *B* lacks this rapport with *C.* This same cooperative attitude is important in all types of interviews, but especially so in the clinical type where there often must be more intimacy. The client is called upon to reveal confidential, personal things, and the interview touches the most sensitive part of him. Unless he has confidence in the counselor and is anxious to cooperate, normal inhibitions will function and these important, intimate details will not come out.

There are no set rules for securing rapport. It calls for ingenuity and adaptation to the individual client on the part of the counselor. Frequently, a little general preliminary conversation is all that is necessary. If the counselor knows of something in which the client is especially interested such as a hobby, it is well to talk about that a bit. Children are encouraged to play with toys which are provided and to talk while playing. Smoking is a distinct help in securing rapport in the case of many adults. Much depends on the attitude with which the client comes to the interview: sometimes he just wants a little advice, but sometimes he has a deep-seated emotional difficulty and comes to the counselor as a last resort.

There are occasions when rapport becomes too good and takes the form of emotional transference to the counselor. An experienced counselor can see this transference coming and can break it up. There will be cases, however, where the client will wish to prolong the treatment and come for additional interviews when the problem has already been solved. In such cases it is desirable to work out definite plans with the patient for the termination of the treatment. Rapport is equally important in the therapeutic type of interview which will be discussed presently. As a matter of fact, one type of interview often leads right into the other, and, in the process of diagnosis, some therapy actually takes place.

Physical set-up of interview. Some consideration should be given to the actual physical setting of the interview. The client may be tense and under emotional strain, and one of the first desiderata is to get him relaxed and comfortable. This may be implemented by comfortable furniture. It is not necessary for the two parties to talk across a desk; something approaching a social conversation in the home is a desirable pattern. It is not even necessary to remain fixed in one position; the client may like to move around a bit and go over to look out the window —it is even possible for the two parties to go out to lunch together. Conscientious counselors occasionally take a client into their own home during some period of emotional crisis.

The client may be much concerned about the privacy of the interview because of the confidential nature of some of the things he wishes to discuss. If he asks permission to close the door, this request usually should be granted. Interruptions from the telephone or the secretary should be minimized because they may occur at some crucial point when the real crux of the client's problem is approaching. It may take a long time to get around to the favorable attitude again.

General considerations in the interview. An important general consideration is that the counselor is dealing with the whole person and not with an isolated segment. The client may express worry about something in connection with his vocation, but the problem ties in also with health, family, friends, recreation, and hobbies. The experienced counselor is alert for something more than the immediate problem and sees the broader setting. Sometimes, things that seem remote from the real problem contribute to it. The interviewer also attempts to determine the relative importance of the events in the individual's history. When the counselor reviews earlier experiences, he may find some which are particularly contributory to the present difficulty. No set outline is necessary in this review, and the whole procedure should be flexible. An inexperienced counselor may be tempted to go routinely through (1) the case history, (2) family history, (3) social history, and so forth. However, the experienced counselor varies the topics according to what he finds and if it is expedient to skip over some point, comes back to it later. If a client is opening up on something that is very important, it is unfortunate to stop him and say, "Let's not talk about that now until we get to the social history."

The clinical interview, in contrast with others, involves emotional factors to a considerable degree. The counselor is alert not merely to overt expressions of emotions but to evidences of deep-seated emotional maladjustment which are manifested only indirectly. The client may actually cover up important symptoms, especially if he is a delinquent who approaches the interview with an attitude of suspicion. Inasmuch as the diagnostic often leads into the therapeutic interview, it is desirable to watch for indications of how much insight the client actually has into his difficulty. This will pave the way for subsequent therapy, because a frequent function of the therapeutic interview is to help the individual to develop insight into his case, so that he can take care of the difficulty himself.

Special techniques in the interview. A few specific things are pertinent for both diagnostic and therapeutic interviews. As conflicts begin to emerge, the counselor wisely asks further questions to bring them out more clearly. If the client brushes over something hastily, it may be particularly significant. It is well to be alert for these casual, hasty mentions, because they may be crucial. Often it is sufficient, in following up such a clue, merely to repeat the client's statement in question form with a rising inflection—for example, "You feel antagonistic toward your father?" This may lead the client to elaborate that point a little more and perhaps get at the crux of the matter. On the other hand, if the client digresses too much on irrelevancies, it is necessary to bring him back with "Now let's see, where were we?" It is inadvisable to let the client feel that he is being quizzed; he should get the impression that he is being given an opportunity to tell his story. A fundamental point in modern interviewing is for the counselor to be sure that the client has a chance to express himself and get it out of his system. If he becomes blocked, some irrelevant statement will help break up the inhibition just as in any emotional situation thinking about something else relieves the tension. In many interviews an historical sequence is satisfactory, beginning with some of the client's childhood or adolescent experiences, particularly his early emotions and aspirations. That may be all that is necessary in order to get a complete story. Naturally much depends on whether the client is a child, an adolescent, or an adult, and flexibility on the part of the counselor is necessary. It is also fully as desirable to encourage expression of feelings and emotions about problems, as to discuss the problems themselves. The client is more apt to achieve insight in this way, and frequently the difficulty lies in his attitude or his feelings about something, rather than in that something itself. This gradual achievement of insight, as will be noted later, is basic in many therapeutic interviews and it can be facilitated by bringing out the emotional aspects during the diagnostic program.

Observation of client during interview. A skilled clinician often gets a good deal of valuable information from noting things which the client does during the interview. It is possible to observe some of these reactions even before the interview, if the counselor happens to pass through the waiting room or glances in the door. Some clinical research projects employ a one-way screen to watch people while they are waiting. It is pertinent to observe whether the client sits apart and seems to resent the conversational efforts of others, whether he looks idly out the window, or whether he picks up something to read. In the interview itself, characteristics like the following may be observed: indifferent, listless and talks deadpan; almost disinclined to talk; very low voice; shy and retiring; tense, alert and jumpy; disturbed by noises or motion in the periphery of his attention; overly busy in the way he walks and sits down; unusually emphatic in his remarks; swaggering; purposeless movements like rubbing the back of his head and drumming with his fingers. Such things as these may indicate emotional difficulties.

The interviewer must also watch for the more serious symptoms that go with the major psychoses. Perhaps the client mentions hallucinations in which he actually sees visions or hears voices talking to him. If he regards these as real, the situation is serious. Much depends, of course, upon the conditions under which the hallucination was observed. A person who reports seeing Christ at a high-powered meeting of some religious cult would not be in so bad a way as one who saw Him on Main Street at the afternoon rush hour. Another serious clinical manifestation is a delusion—the client's mistaken idea that he is somebody else of great importance or that someone is persecuting him. A psychotic patient may cover up these delusions, particularly if he is in court or under examination for some legal purpose, but they are apt to come out in the clinical interview where rapport is better. Amnesia—unusual difficulty in remembering certain things—is another symptom. There may be general inability to perform voluntary acts where the client behaves as though it were very difficult to pick up an object or to express himself. Then, there are frequent disorders of association where one goes off in sort of a flight of ideas—one idea suggesting another and that still another with great rapidity. Finally, evidences of excitement and moods may be of pathological significance. A clinical psychologist conducting an interview is alert for various deviations of this sort which may contribute to the total case picture. After a wide experience with all kinds of patients, he develops a facility in evaluating the importance of these different symptoms.

Case History

It is routine in practically all good clinics to supplement other diagnostic devices with a detailed case history. This makes it possible to locate contributory causes in previous things which have happened to the client. Information is secured from the family or other persons who know the individual, and from the client himself. The forms for referral and medical and school history mentioned earlier, contribute in this direction. A social worker may go out and interview neighbors, associates, and employers. Outside individuals can contribute information about unusual kinds of behavior such as seclusiveness, restlessness, aimlessness, alcoholism, migrating to a new place, instability on the job, contention with fellow workers, or girl trouble. Then somebody takes over the job of writing up a detailed case history for the individual's folder.

Reason for referral. A major item in the usual case history is a statement of the actual problem which has led to the referral of the individual to the clinic. Perhaps it is tantrums which occur only at home and never elsewhere, suggesting that something about the home situation is a causative factor. Antisocial trends may be the reason for referral, ranging from disciplinary difficulties in the home to outright delinquency. Sex problems are frequent. Any kind of attack, such as convulsions or fainting spells may be significant.

Family history. Another major consideration is the family history. Many times when a problem child is referred to the clinic, it becomes necessary to go to work on the parent rather than the child. A domineering or an overprotective attitude harms the child's emotional adjustment. If the parents have unfortunate relations between themselves, this emotional atmosphere is reflected in the child. If there are brothers and sisters, parental attitudes toward one child have a bearing on another child's emotional adjustment. Recreational facilities and the cultural status of the home and the neighborhood are significant. To bring out some of these relationships requires a good deal of tact on the part of the counselor interviewing parents.

Personal history. Another routine feature of the case history is the actual history of the individual himself. It generally begins with birth or even the preceding pregnancy. Behavior with reference to food may be of interest. School progress plays a part. Medical aspects presumably have been covered by a separate medical report prior to the clinical interview. This makes special note of any complicating physical factors that might be causing the present difficulties. Recreational interests are important in the personal history because very often a person's adjustment to life depends on his avocational pursuits. His objectives and ambitions may be pertinent and, of course, if he has reached the age where he has been working, his employment and work history have a bearing on his mental adjustment.

Clinical Tests

A very necessary aspect of the clinical psychologist's work is psychometric. As in so many other fields of psychology, when it is desired to evaluate individual differences, psychological tests contribute information which can be obtained in no other way. Some discussion of tests has already occurred in earlier chapters. It will be necessary here merely to describe some additional tests which are useful in clinical practice. For the most part, the clinician employs individual rather than group tests. This makes it possible for him to observe incidental behavior during the test. Just as during the interview he watches for evidences of instability, unusual associations, tremors, and the like, in administering an individual test he is likewise alert for any symptoms of this type. He may have occasion to refer to group tests which have been taken previously in school or elsewhere, but usually does not administer such tests himself. By means of tests, it is possible to correct any errors in the interviewer's initial judgment. The fact that a client had quite low intelligence, might be overlooked in the interview because of a pleasant personality.

Intelligence tests. Individual intelligence tests are widely used in psychological clinics. In many instances, it is practically routine to administer a Binet test early in the program. It will be recalled that the Binet test yields a mental age, and this divided by the chronological age, gives the I.Q. (page 70). For clients with a language handicap, there are performance tests such as picture-completion tests and form boards. For illiterates, the Army developed performance tests which involved following different patterns of directions. For example, a number of items were placed on the table and the subject was told to "Put the wrench at the right side of the screwdriver and turn the hammer so that its head points toward you instead of away from you." Further details regarding intelligence tests will not be given at this point except to recur to the distinction between abstract, mechanical and social intelligence. In psychological clinics, tests of abstract intelligence are used for the most part. This brief mention should not leave the impression that intelligence tests are unimportant in clinical practice. On the contrary, they constitute one of the most widely used devices in this field.

Personality inventories. As indicated earlier, few good personality tests are available. Most of them are of the personal inventory type and require the subject to evaluate himself—to tell what he worries about or what he would do in certain situations. Such a test involves the danger that the individual will not give the answer which really characterizes him, but one which he thinks will help him in some way. This error is particularly insidious if he is attempting to secure a job. In the psychological clinics, except in dealing with delinquents, this difficulty is not as great because the client is seeking help and is more inclined to cooperate. Good rapport will help to insure this cooperation.

One widely used test includes items like the following, each of which is preceded by the three alternatives, *Yes, No, ?,* one of which the subject checks.

Does it make you uncomfortable to be different or unconventional?
Do you daydream frequently?
Do you usually think things out for yourself rather than get someone to show you?
Have you ever crossed the street to avoid meeting some person?
Do you ever give money to beggars?
Do you frequently argue over prices with tradesmen?

A scoring key is provided so that if the interest is in neurotic tendencies, certain responses on the blank are scored +2, others +3, and some have minus values. Other patterns are available for scoring the blank for self-sufficiency, for introversion-extroversion, and for dominance-submission.

Another test of this general type is the Minnesota Multiphasic Personality Test. It consists of between five and six hundred items which are to be checked according to whether they are true or false. Some items are designed to indicate paranoid tendency which is manifested by a tendency to exaggerate one's own importance or one's own difficulties, for example:

> I feel I have often been punished without cause.
> I think I feel more intensely than most people.

The following items deal with depression:

> I sweat easily even on cool days.
> I dream frequently about things that are best kept to myself.

The following items are concerned with hysteria:

> I often notice my hands shake.
> I find it hard to keep my mind on a task.

The following involve schizophrenia, one of the major psychoses characterized by a withdrawing tendency, instability, delusions, and hallucinations:

> I have had blank spells.
> At times, I have fits of laughing and crying that I can't control.
> I have had periods in which I carried on activities without knowing later what I had been doing.

The schedule has other groups of items dealing with hypochondria, psychopathic deviation, psychasthenia, hypomania, and also masculinity or femininity. It is possible, too, to detect malingering to some extent by noting if the subject always checks alternatives that put him in a favorable position.

Association tests. If a client is given an idea and, through a process of association, another idea is called up, the direction in which that association turns may be significant. Unusual associations especially may be diagnostic. An obvious approach is to make up a standard series of stimulus words and find the associations which normally are given to those words. The Kent-Rosanoff Association Test consists of a hundred such words, and the most frequent responses given to them by 1,000 normal persons. For the word "Dark" 43 per cent of the standard group said "light," 22 per cent said "night," 7 per cent said "black," and the other responses had lesser frequencies. When the test is administered, the subject is simply given the stimulus word and responds with the first word that occurs to him. It is scored according to how many "common" responses—responses in the standard list—and how many "individual" responses a subject gives. A sample of insane persons gave 27 per cent individual responses, whereas a random sample of normal people gave only 7 per cent. Thus, a large number of atypical associations appears suspicious. Incidentally, an individual response may point toward some particular field of interest or anxiety which may aid in diagnosis.

Projective techniques are widely used in clinical practice. Various types of test material are employed, but the general principle involves presenting some kind of situation and encouraging the client to project himself into that situation, and thus reveal some of his own feelings, attitudes, or other aspects of personality. Projective techniques may be classified roughly according to the kind of material that is used in the test. A number of them present pictures which the subject is asked to interpret. If the picture comprises people, he is supposed to tell what they are doing or how they feel, and in the process of so doing, he may indicate his own feelings. If a picture shows a woman standing weeping while a man is going out the door, and the subject has girl trouble, he is quite apt to interpret the picture as the termination of a lovers' quarrel rather than as a son going off to war. Various tests of this sort with standardized material are available. One which is widely used is called the Thematic Apperception Test and instructs the subject to tell a story about the picture, what happened before the picture, what is going on now, and what is going to happen. This test includes the following pictures:

A woman on a couch, evidently dead or asleep, and a man standing beside her with one arm covering his eyes.
A child going up a big stairway.
An abstract scene with a house and a chimney and some weird clouds.
A man by a lamp post.
A wistful-looking girl.
A boy looking at a violin.
A child sitting in the door of a log cabin.

A variation of this procedure utilizes the fairy tale motif. The subject is encouraged to believe that each picture represents a fairy tale and he is to tell what happened, and what is about to happen. Some of the pictures resemble Disney animated drawings with dwarfs, fairies, nymphs, kings, symbols like knives, guns, whips, musical instruments, and various scenes involving chasms, mountains, forests, and clouds. It is possible to note characters with which the subject identifies himself and even to grade the intensity of response to some extent. For example, if the subject thinks it is going to rain, it is less serious than if he thinks there is going to be a tornado.[1] A variation of the procedure is to have the pictures in pairs and let the subject select the one which he prefers.

Another projective approach is to provide little stories which the subject retells after hearing them or which he completes where portions are omitted. In the retelling or in the completion he may introduce some of his own attitudes. Art media such as finger painting or clay modeling sometimes furnish opportunities for projection, particularly with children. The child playing with clay who makes a human figure which represents his step-father, and begins to berate this clay model, or beat it up, reveals something about his attitude toward the step-parent. Dramatic play may operate in similar fashion. If a group of subjects in the clinic goes through simple dramatic performances in which they are encouraged to take roles, their actual choice of roles and the way they carry them out may reveal something to an acute observer. This technique is known as "psycho-drama." Even playing with puppets or dolls rather than participating dramatically one's self, the individual may reveal certain trends. Children are given dolls with which to play in the clinic, and on the basis of previous information, the dolls are dressed roughly to correspond to the members of the child's own family. The child very frequently takes a role in the family situation, and many aspects of the family adjustment come out in the course of this play.

Projective techniques have been carried even into the auditory field. An instrument is designed to give low vowel sounds that resemble speech without involving actual words and the subject tells "what the voice is saying." If he does not give up entirely because of the inaudibility of the material, he will probably interpret these sounds in accordance with his own sets and attitudes.[2]

A projective technique that has received a lot of attention on the part of clinical psychologists is the use of ink blots which the subject is to describe according to what he sees in them. Such blots were used originally as a test of imagination, possibly taking a cue from cloudpictures. Ink blots are less conventionalized than the actual pictures used in other projective techniques, so that the individual can project himself into them to a possibly greater extent. A lot of the initial work with ink blots from the projective standpoint was done by a Swiss psychiatrist named Rorschach and for some reason his name stuck to the whole project. Moreover the ten blots that he published originally have been duplicated and widely used. Any other set of blots would probably have been equally successful, but a great deal of data is available for this set, and it has been accepted as the standard.

---

[1] Wekstein, L., "A Preliminary Outline for a Fantasy Projection Technique as a Clinical Instrument," *Journal of Psychology,* 1945, 19, 341–346.

[2] For a general reference on projective techniques and an extensive bibliography see: Sargent, H., "Protective Methods, Their Origins, Theory and Application in Personality Research," *Psychological Bulletin,* 1945, 42, 257–293.

Sometimes the subject's reaction to the blots can be interpreted in a rather obvious though qualitative manner. He may read a lot of sex pictures into the blots or see women's hats or weapons, thus reflecting his attitudes or interests. It has been demonstrated experimentally that a person can be given an artificial set or attitude so that he will project in a certain fashion. A hypnotized patient was told that she was Madame Curie and was then given the Rorschach test. She saw many scientific items in the blots—beakers, burners, thermostats. This occurred in 21 out of the 40 pictures reported. On the other hand, when the same individual was told that she was Mae West, she saw 22 out of 33 pictures dealing with costumes, gowns, shoes, hats, and the like. When no role at all was suggested, 15 out of 35 pictures dealt with things that were French and it developed later that she had hoped to secure a job as interpreter in the French Embassy.[3]

Instead of relying entirely on miscellaneous qualitative results, quantitative methods of scoring the test have been devised. There are a number of systems, or schools, for scoring the test and interpreting the results from a diagnostic standpoint. It is not worth while to discuss here the fine points of distinction, but we will mention some of the factors often used in the scoring. In the first place, it is interesting to note the location of the thing that is seen in the ink blot, whether it involves the whole figure or just some detail, whether that detail is a common one or a rare one (a list of such common details is provided for each blot), or whether the subject reacts to the white space or just to the blot itself A second consideration is the content—whether what is seen is a human, an animal, a portion of either, scenery, or a map. A third point is originality—whether the subject sees items that every one else sees or whether they are rare in the sense of not being reported by more than one per cent of those who take the test. A fourth consideration is the determinants—whether the object seen involves action or movement, whether it has a definite or indefinite form, whether it involves names or colors. These are just a few of the items on which the blank is scored. Formulae are available to determine personality patterns. Feebleminded show very meager responses. Some schizophrenics manifest a lot of absurd responses and put together impossible things like an elephant with two heads. The manic type may manifest a lot of pleasure in his interpretations, and the depressed will manifest more self-depreciation. Response to the shading of the blots may indicate anxiety. A preponderance of color responses over movement responses has been found for stutterers. Numerous other interpretations along these lines have been derived.

---

[3] Sarbin, T. R., "The Concept of Role Taking," *Sociometry,* 1943, 6, 273–285.

It should be mentioned in passing that projective techniques sometimes have therapeutic value. The youngster who mistreats the clay model of his disliked step-parent obtains emotional release in the process. The actor in the psycho-drama who plays the role of King Arthur gets some of the paranoid urges out of his system.

Psychoanalysis

Basic principles. One diagnostic technique deserves special mention, partly because it is misunderstood and its importance exaggerated by the layman. The term psychoanalysis is often used erroneously to mean almost any kind of clinical examination, whereas it actually deals with a special point of view and techniques growing out of that point of view. It goes back to the original work of Freud and is often termed "Freudian Psychology." The basic principles underlying psychoanalysis sound a bit fantastic partly because of some of the terminology employed, but, as a matter of fact, the mechanisms postulated seem to work in certain practical situations.

The psychoanalytic point of view postulates three "selves"—three dynamic aspects of personality. The first is the *ego,* which is the conscious self and is in contact with time, space, and physical reality. It is concerned with a balance between the organism and its environment. It is not moral and has nothing to do with guilt. Dynamically, it is somewhat opposed to the id and the superego. The second self is called the *id,* and is the source of psychobiological energy directed toward libidinal and aggressive satisfaction. It has purely hedonistic strivings, that is, it seeks pleasure or self-gratification. An infant's personality is supposed to be comprised mostly of id. The third self is the *superego,* which is the voice of social respectability. It is something akin to what is ordinarily termed "conscience." Criminals are supposed to lack it.

Much of the dynamics of the Freudian psychology arises from conflict between these three aspects. The ego tends to keep the other two selves balanced with their environment. The balance, however, is often upset, with resulting conflict, which may be unconscious. The id is striving toward basic biological satisfaction, and the superego is trying to keep the individual respectable. Some of the conflicts between these two selves come out indirectly. For example, the id has designs on somebody else's wife, but the superego, representing social taboo, works in the other direction. The individual may not be aware of the real conflict at all, but it comes out indirectly in a dream. The resolution of these conflicts is the goal of psychoanalysis.

Freudian mechanisms. This conflict between the different selves may result in various mechanisms which are grist for the mill of the psychoanalyst. One of the most common is repression, which often results in a "suppressed complex." The notion is that an idea that is unpleasant to the ego is repressed into the unconscious together with other ideas that are associated with it. The energy has no direct outlet and produces various symptoms or maladjustments. These repressions are especially common with reference to love and hate. The repressed ideas try to get out, as it were, but are kept down by the ego and superego. This constellation of ideas, which is repressed, may have a wish connected with it and is then termed a suppressed complex.

Several things may happen with these suppressed complexes. One of them may drag under other things associated with it. A man dislikes a rival and wishes he did not exist and, in the process of suppressing this wish, he forgets the rival's telephone number or address. On the other hand, the complex may break out through some item associated with it. A woman was suppressing memories of a disastrous love affair, which had terminated at the same time that a pie was burning in the oven. This complex had an outlet as an hallucination of burning pie crust which she smelled continually.

Dreams are one of the most frequent outlets of these complexes, but it is a mistake to assume that all dreams are so caused. Many a dream is merely a response to external stimuli during sleep. A person hears a distant fire alarm and has an extensive dream regarding a fire. A youngster dreamed he was in Heaven, heard the blast of Gabriel's horn and saw a great blaze of glory, and woke to find the sun shining on his face and the factory whistles blowing nearby. It is possible to make a person dream of walking or running by putting a bit of adhesive tape on the sole of his foot so that there is tension on the skin.

Some dreams, however, are disguised fulfillments of suppressed wishes. The disguise may take symbolic or indirect form. A man will not dream directly that a rival is dead, but he will dream of a funeral procession in which the deceased has a beard like the rival's, and the dreamer himself, dressed like a flower girl, is at the head of the procession dancing and throwing flowers. The flower girl is symbolic of the dreamer's pleasure at the demise of the rival.

Other manifestations of these complexes are little slips that occur in everyday life such as slips of the tongue or slips of the pen. A dipsomaniac, for example, began a letter to a girl, "Dear Ethyl." A person may forget his own phone number if he dislikes the rest of his family, or may lose his key when he really does not want to go home.

Psychoanalytic techniques. One of the main techniques used by the psychoanalyst is dream analysis. The client is given some detail from the dream, asked what it suggests and then what leads from that, and so forth, in a free association process. This series of associations may lead to something that is crucial. Other items from the dream are then used in the same fashion and perhaps several of these trains of association will converge on one thing that is part of the suppressed complex. Another procedure is to do a free association starting without a particular stimulus word, but merely encouraging the client to talk about himself. Usually the client is somewhat relaxed, possibly reclining, and the analyst is inconspicuously nearby taking notes. Without much questioning, the client is encouraged to go on with these free associations and discuss all kinds of previous experiences. When he gets in the vicinity of a complex, he is liable to become somewhat inhibited and that, in itself, is diagnostic. A technique that is occasionally used for more stubborn cases where it is suspected that the real difficulty, as is so often the case, goes back to some early childhood experience, is to use hypnotic age regression. The subject is hypnotized, told that he is seven years old and asked to describe what he is doing and what he has been doing. This technique may bring out details that would be difficult to recover in the ordinary waking state. Some traumatic experience at a younger age may be of considerable significance. In many instances the effective treatment of such a case involves locating the suppression and bringing it to the surface by talking about it frankly so that there is no more suppression. Then the symptoms may disappear. In the case of the pie-crust hallucination, when the woman went back and re-lived the original experience, admitting her desires in the whole matter, the hallucination cleared up. In general, the practitioner does not resort to hypnosis except in the more stubborn cases.

Causation of Major Mental Disorders

The question now arises as to what these major diagnostic techniques reveal. The diagnosis of a mental case is analogous to ordinary medical practice in which a certain combination of symptoms—rise in bodily temperature, change in blood count, and location of pain—may indicate appendicitis. Similarly, a certain combination of hallucinations, illusions, amnesia, vagaries in the association process, withdrawal tendencies, and general instability, may denote schizophrenia, manic depressive insanity, and the like. The present chapter cannot recount these combinations of symptoms in great detail, but will give a very cursory picture of some typical mental disorders. It may be well to classify them, at the outset, in two types, based on severity. On the one hand, the major disorders may be considered as those which usually need institutional treatment, whereas the minor disorders often can be cleared up in therapeutic interviews.

An initial consideration, before describing different disorders, is the general question of their causation. It is generally agreed that the major disorders have a predisposing cause and an exciting cause. The individual is ready to go insane, but does not do so unless something comes along to touch it off—some trigger, as it were. The predisposing cause is very frequently heredity, and the exciting cause is something in the environment such as emotional stress, physical illness, domestic difficulty, or business troubles.

For the predisposing cause, there is ample evidence that mental disorder runs in the family. A rigid interpretation and evaluation of the data, however, is difficult. If the theory of predisposing and exciting causes is correct, this difficulty is understandable. Suppose that the hereditary component does follow some specific genetic law, the actual statistical results will come up to theoretical expectation only if every person with the hereditary potentiality becomes insane. This will occur only if every one of them encounters an exciting cause, which is very unlikely. Thus, an outright formulation of some law regarding the inheritance of mental disorder is almost impossible. Some of the earlier studies of family histories hinted that the predisposition to mental disorder was inherited much like a recessive trait following Mendel's law. This law makes it possible to predict the probability of a trait's occurrence in offspring, if the makeup of the parents with reference to that particular trait is known. If this were true, two insane parents would always have insane children, whereas for two parents who were both normal but carried the taint, approximately one fourth of their children would be mentally disordered. Subsequent studies have not borne out this hypothesis in detail, but there are still evidences of a family basis for mental disorder.[4]

Many statistical analyses have been made of the incidence of mental disorder among the relatives of disordered patients. For instance, in a study of patients with schizophrenia, 5 per cent of their brothers or sisters had it, and 2 per cent of their grandchildren. Similarly, with manic depressive patients, 10 per cent of their brothers or sisters had it, and it was three times as frequent with their cousins as would be expected in the general population. Although epileptics constitute about three tenths of one per cent of the population, the disease was found in 10 per cent of the children of epileptics and in 3 per cent of the brothers and sisters of epileptics.[5] Another study of epileptics found that 64 per cent of them had epileptic relatives and 78 per cent had relatives with some mental disorder.[6]

Studies of twins, especially identical twins, are significant in this connection because twins represent a case where there is great hereditary similarity. Of 19 pairs of male identical twins one of whom had schizophrenia, 10 of the other brothers had the same disease, and in another group of identical twins where one brother had schizophrenia, some of the other brothers had such mental disorders as epilepsy or chronic alcoholism.[7] A leading text on genetics summarizes various reports to the effect that if one identical twin has dementia praecox (schizophrenia) the other nearly always does, whereas for fraternal twins, if one has it, the other does so about one fourth of the time.[8] Similarly, for manic depressive insanity, of 23 identical twins where one was affected, 16 of the others were too, whereas for fraternal twins the figure was 3 out of 32.[9] It is probable that the hereditary predisposition in this connection is not highly specific. Although sometimes a person with a mental disorder has relatives with the identical disorder, frequently the relatives have another kind of disorder. One inherits a predisposition to instability and mental disease but not specific disposition to a specific malady.

---

[4] See Pollock, H. M. and Malzberg, B., "Heredity and Environmental Factors in the Causation of Manic Depressive Psychosis and Dementia Praecox," *American Journal of Psychiatry,* 1940, 96, 1227–1244.

[5] Luxemberger, H., "Important Results of Investigations Into the Hereditary Transmission of Psychical Defects and Their Bearing on Practical Eugenics," *Archiv für Gynokologie,* 1931, 141, No. 2.

[6] Brown, R. R., "A Study of the Mental and Physical Traits of the Relatives of Epileptics," *Journal of Applied Psychology,* 1930, 14, 620–636.

[7] Myacin, A., Ayer, J. B., and Putnam, T. J., *et al., Eugenical Sterilization,* page 162. New York: Macmillan, 1936.

[8] Snyder, L. H., *Principles of Heredity,* page 40. New York Health, 1940.

[9] Rosanoff, A. J., Handy, L. M., and Plesset, I. R., "The Etiology of Manic Depressive Syndromes with Special Reference to Their Occurrence in Twins," *American Journal of Psychiatry,* 1935, 91, 4, 725–760.

Exciting causes of mental disorder are varied. Sometimes the cause is an emotional shock like a severe disappointment. War experiences may be still more traumatic in this respect. Severe illness of a physical nature or overwork may operate, and the financial stresses of middle life often precipitate a psychosis. There are even indications that urban life with its stresses, is a factor. At least, the rate of admission to mental institutions in the United States as a whole is about twice as high for the urban as for the rural population.[10] In prewar Russia there was less manic depressive insanity than in the United States. This has been explained by the smaller incidence of disturbing influences such as unemployment, business difficulties, insecurity, social striving, and competitive life in general.[11]

We do not imply that the major mental disorders always are based on heredity. It is probable that a sufficiently violent experience can cause a breakdown in a person with no predisposition. However, from the broad social standpoint, we should recognize the importance of hereditary predisposition in the great majority of the cases. Although the exciting cause may not materialize, the danger for succeeding generations is still present.

Psychogenic Disorder

We shall now examine briefly some of the types of mental disorder which the clinical psychologist encounters. There is no universally agreed upon system of classification, and there is even disagreement on terminology, so that the following discussion must perforce be somewhat eclectic and arbitrary. A reasonably satisfactory classification involves (1) psychogenic disorders; (2) physiogenic disorders; (3) psychoneuroses; (4) minor maladjustments. The first implies that the difficulty is mental in origin or, at least, that there is no obvious bodily causative factor. The second may be traced directly to physical factors, such as a toxin in the system or a cranial injury. The psychoneuroses are somewhat intermediate between the major and the minor disorders and respond to treatment, whereas the first two types have a prognosis which is none too favorable. The fourth type involves inadequate adjustment to frustrating situations.

Schizophrenia. One of the most frequent of the major psychoses is schizophrenia, sometimes called dementia praecox. In general, the victim lives in a fantasy world and is characterized by a "shut-in" personality. There are several types of schizophrenia. In the *simplex* type the patient is shiftless, aimless, and lazy, and otherwise resembles a moron, except that he develops normally until the disease hits him, whereas the moron is always that way. The *paranoid* variety is often characterized by delusions of persecution. The patient believes that people are after him and that his life is in danger and he may take steps to counteract these sinister agencies. This is the type that sometimes gets a weapon and runs amuck in a crowd where he thinks he recognizes the persecutors. He may also have delusions of grandeur, in which he thinks he is some notable individual or even a deity, and tries to act the part. The *hebephrenic* is a very regressive type. The patient practically rots. He is harmless, talks nonsense, repeats meaningless phrases, makes up new words, and sometimes does what appears like a very poor job of clowning. The most characteristic feature of the *catatonic* type is a waxy flexibility. The patient can be molded into an inconvenient posture and will stay there for some time. He may go into a stuporous condition. Sometimes he repeats every word after any speaker in a meaningless fashion. If he is asked a question, he simply asks you the same question himself. On other occasions, the catatonic becomes mute and negativistic and takes a general leave-me-alone attitude. Schizophrenia usually comes on early in life.

---

[10] Landis, C. and Page, J. P., *Modern Society and Mental Diseases*, page 46. New York: Farrar and Rinehart, 1938.

[11] *Ibid*, page 115.

Manic depressive insanity, as the name suggests, comprises two aspects. One is characterized by manic excitement. The patient talks rapidly, often with a flight of ideas—one association leading to another in rapid succession. He gesticulates and paces about, and his motions are quick and jerky. In the depressed phase the patient is slow in thinking, lacks initiative, seems licked, and as though his general outlook was "What's the use?" These two phases combine in various patterns. In recurrent mania there is a manic period followed by a normal period, then another manic, then a normal, and so on. Similarly recurrent depression has a depressed period, then a normal, then a depressed, and so forth. The alternating type has a manic phase, a normal, a depressed, a normal, and then repeats that cycle. Seldom is there a sharp swing from manic to depressed and back without intervening normal periods. This psychosis is characterized by remissions in which the patient is apparently completely cured for a while, followed by recurrence of the psychosis. Everyone has known of persons who became insane, were institutionalized, recovered, went to work again, and then had to return to the institution.

Paranoid personality involves delusions of persecution or grandeur much like those found in schizophrenia. The delusions are more logical and the patient takes them very seriously. He keeps in touch with reality a bit more and is not quite so much in a fantasy world.

Constitutional psychopathic inferiority is characterized by unpredictability of behavior and general inadequacy. The vocational history generally comprises an abnormally large number of jobs. The patient is restless and uncertain. He has little moral or ethical sense but is completely satisfied with himself and is never wrong. He fails to conform to social convention, lacks purpose, and is unresponsive to training, discipline, or treatment. The hair-trigger type of emotional instability is frequent.

Melancholia comes on frequently in middle life and is characterized by profound depression. The patient paces back and forth, showing every evidence of great suffering, but it is usually impossible to find out just exactly what is wrong. He says, "It is terrible," but it is difficult to find out what is terrible. Suicide is a frequent result. In some instances the endocrine changes in middle life are the exciting cause.

The foregoing psychogenic disorders are not very amenable to treatment in the present state of science. It will be noted in the next chapter that some drastic therapeutic procedures have been tried with varying degrees of success. At present, most of these cases, however, are considered to have an unfavorable prognosis.

Physiogenic Mental Disorders

Paresis. Some psychoses have obvious physical factors in their causation. It is probable that these physical factors serve as the exciting cause rather than the predisposing cause, but at any rate they are present. Paresis can be traced definitely to syphilis. It is characterized by paranoid tendencies. A paretic in court tells the judge of his own importance and points out that he came to court as a personal favor to the judge. Or the delusion is to the effect that he is wealthy, and he writes large checks against his imaginary bank account. Euphoria, a feeling of well-being, is frequent. Even toward the end of the case, when the patient is so weak he can scarcely move in bed, he will still say that he is having a good time and that everything is fine. The paretic often forgets very simple things such as his own address, and frequently is confused, gets into the wrong house, or takes a bath with his clothes on. Speech and gait are sometimes affected. The usual case is fatal in a few years.

Senile dementia comes on in old age, and the patients are troublesome rather than dangerous. They are easily disoriented and, for example, get lost in the house at night. They tend to live back in the "good old days" and have some delusions. They may commit minor sex offenses and petty thievery but they are not as serious a social problem as some of the other psychoses.

Toxic psychoses. Some insanities are brought on by poisons in the system. A common one is delirium tremens which results from excessive alcoholism. The patient is disoriented and does not recognize his friends. A characteristic symptom is visual hallucinations of moving objects such as snakes or insects. These are extremely vivid and terrifying. A patient who is convalescing will lie extremely quiet lest the snakes come back. Recovery is frequent after the toxin gets out of the system.

Traumatic psychoses are caused by physical injury. The most obvious type is brain injury, resulting from a blow on the head. The symptoms include acute fatigue, excitability, headaches, and sensitivity to noise, heat, and ventilation. The pattern may resemble epilepsy or hysteria.

Epilepsy usually is classed as a physiogenic disorder, although the exact physical cause is not clear. It may be something in the body chemistry, because there have been partially successful efforts to treat it by diet. An epileptic is not necessarily completely incapacitated throughout life. Among famous epileptics of history were Julius Caesar, Alexander the Great, Maupassant, and Dostoyevsky. The patient has brief attacks, but between them he is apparently all right. Two types of epilepsy are to be distinguished. *Grand mal* involves moodiness, nausea, and muscular jerking at times, and occasionally the patient becomes unconscious, makes weird sounds, becomes rigid or makes convulsive reactions which terminate in stuporous sleep. In the other type, called *petit mal,* there is a momentary loss of consciousness and some involuntary jerking, but the person is not really out for any length of time. It is possible to predict the onset of an attack by means of brain waves, technically called the encephalogram. The technique consists essentially of putting electrodes which are connected with a complicated electric circuit, on the surface of the skull. Very slight changes in voltage between different regions of the skull can be recorded, and reflect activity in the underlying brain tissue. The record normally shows a characteristic rhythmic change in voltage—hence the brain wave. Disturbances in this rhythm occur some time before an epileptic seizure. Periodic observation of the encephalogram will make it possible to foresee some of the attacks and take appropriate precautions.

Psychoneuroses

The psychoneuroses are less serious than the psychoses and yield more readily to psychotherapy. The individual usually does not require institutional treatment. His personality is more intact; he is fairly well socialized; he discriminates such realities as time, place, and his own identity; his thinking is fairly clear; he has no delusions like the schizophrenic, nor vagaries in his association process; emotional deviations, although present, are not so pronounced; and he recognizes the existence of his difficulty, although he may not understand the causative factors. Prognosis is, therefore, more favorable, but still the psychoneuroses are more serious than the maladjustments which require merely a little mental hygiene. Psychoneuroses are usually subdivided into three types: neurasthenia, psychasthenia, and hysteria.

Neurasthenia is characterized by a sort of chronic fatigue. It is sometimes spoken of as nervous exhaustion. There may be some hypochondria with it, that is, the patient may feel that he has various other ailments and may react not to a disease but to a threat of disease.

Psychasthenia. The psychasthenic is extremely fussy and meticulous, sometimes described as "nasty nice." There may be a morbid attention to detail. The patient will rearrange materials in the drawer of a desk or dresser, then return in a few minutes and do the same thing all over again. He will be much disturbed when driving if the telephone poles along the roadside are askew rather than uniformly upright. The scrupulousness of this neurosis sometimes leads to such compulsions as always covering a chair with some fresh material before sitting in it, or refusing to handle currency unless it is new. There may be phobias like an abnormal fear of cats or of being shut in a small place.

Hysteria usually appears in one of two forms—anxiety or conversion. The former is the type of behavior connoted by the popular term "hysterics." The individual goes to pieces at things that would not disturb a normal person—a loud sound, for example. Any severe emotional experience is liable to precipitate a crisis. There often is dissociation—some bit of behavior will split off from the rest of the personality and temporarily dominate the scene. A woman who had been shocked by the experience of being chased by a man occasionally jumped up, seized a toy wheelbarrow, and tore around the back yard. A woman who had been tremendously attached to her dog, now deceased, sometimes lay down on the rug where the dog used to sleep and made sounds like those of a dog. A more extreme case of dissociation is dual personality, in which the person may alternately act like an adult and like a child. The shift from one personality to the other may be sudden.

The conversion type of hysteria is characterized especially by physical symptoms which, however, have no actual physical basis. The energy which is blocked by some conflict is converted into this physical symptom

—hence, the name conversion. Sometimes it takes an anaesthetic form, in which an area of the skin is completely insensitive. The area does not conform to the actual neural supply to the skin, but may, for example, be the area that would normally be covered by a glove or by a stocking. An injury to the cutaneous nerve supply would never provide this particular pattern of anaesthesia. Paralysis is another manifestation of conversion hysteria. It may affect the limbs so that the person is unable to walk, or it may affect the speech muscles so that he cannot talk. A workman touched some electric terminals and thought he received a shock of several thousand volts. He was able to walk home, but presently developed a paralysis of the limb in which he thought he received the shock. He brought suit against the company, and as long as the case was pending the paralysis remained. Finally, he was awarded $25,000 and thereupon gradually recovered. It was not a case of malingering but actually an hysterical manifestation. Even temporary blindness has resulted from hysteria. The hyperkinetic type of conversion hysteria involves spasmodic jerking, excessive tension, sometimes convulsive behavior, and stuttering. Some tics are of this origin. A man had a facial tic affecting his left eye that had been bothering him for ten years. Hypnosis revealed that he had had an unhappy marriage after a disastrous love affair, but the question arose as to why this affected the left eye. By the technique of hypnotic age regression, it was possible to uncover the fact that he had been hit with a baseball bat in his left eye and that there had been some twitching at that time. Evidently, the eye was all ready to respond again when some adequate cause for the development of the tic was present.[12] Another manifestation is paraesthesia—tingling of the fingers, or the feeling that insects are crawling over the skin, or a burning sensation. Occasionally there is amnesia and extreme dissociation. The person forgets his way of life and goes away, "waking up" later in a distant city as his former self.

Minor Maladjustments—Goals and Barriers

Many minor mental difficulties result from conflict between what one wants to do and what one is able to do. Normally, these situations are handled in some satisfactory fashion, but if they are not, mental maladjustment ensues. Much of human behavior is goal-directed, and there is tension until the goal is achieved. If one is hungry, and can act so as to satisfy the hunger, tension is reduced. The final event that relieves the tension is termed a consummatory response. In many cases something intervenes to block this consummatory response, and there is trouble. The student's goal may be to become a popular athlete, but he is blocked by insufficient physical strength. It should be noted, however, that mere deprivation does not always constitute frustration. Take sex, for instance. An attractive woman who spurns men for the sake of her career may be normally adjusted, whereas an unattractive woman who is unable to arouse the interest of men becomes an eccentric spinster. It is the manner in which the individual reacts to the barrier between himself and the goal that determines whether he is really frustrated and has a maladjustment.

---

[12] Sarbin, T. R., "The Concept of Role Taking," *Sociometry,* 1943, 6, 273–285.

Kinds of Barriers

Capacity. Certain types of barriers come between an individual and his goal. Sometimes he simply lacks the capacity to do what he desires or what is expected of him. It may be an organic difficulty such as small physical stature that incapacitates him for an athletic career, or defective hearing that handicaps him socially. It may be inadequate intellectual capacity for a job that he really wants because of the social rewards that go with it. There may even be special disabilities—a lack of arithmetic comprehension that makes an engineering career impossible. A frequent difficulty is that the individual's level of aspiration is too high. This is sometimes termed the "Horatio Alger delusion," that is, the notion that anybody can go from rags to riches by hard work. If a person of low native capacity is indoctrinated with this idea, he is doomed to some frustration.

Change of activities. A barrier or blocking may occur because of some change in the person's activities, resulting usually from things beyond his control. The death of a relative, or separation from the family, or the disloyalty of some member of the family imposes adjustment problems. Sometimes a decision between a career and marriage precipitates mental difficulty, or a lower standard of living may be forced upon a person; he may even lose his job or be compelled to take an unsatisfactory job.

These change-of-activities problems are especially pronounced in a postwar period. The woman who worked in a munitions plant and then returns to domestic work or her former job in the laundry faces adjustment problems. A man discharged from the Army with the rank of Captain is offered his former job as office boy. Some soldiers find it difficult to adjust to the release from authority with no particular anchorage to orient their behavior. Those who had exercised considerable military authority tend to carry it over into civilian life where it will not work. The return to sedentary life after an active period in the field is difficult. Many soldiers who were married before going overseas worried about infidelity on the part of their wives. Accelerated maturity is a problem: the soldier had a whole avalanche of experience in a short time, and when he returns home, his friends treat him as a youngster, whereas he feels thirty. In cases where there was some traumatic military experience, of course, the resulting maladjustments are quite understandable. If the personality was stable to begin with, the man may make adequate adjustment to his injury, even though it is obvious to other people. His friends would accept it as part of him, just as they accept false teeth. If, however, his personality was unstable to begin with, he may convert the handicap into a device to control the environment, to get attention, to be waited on, and to escape adjustment.

Interruptions of life activity. Somewhat related to the change-of-activity barriers are those arising out of actual interruption of some ongoing life activity. An everyday instance is the person who is continually nagged so that everything he attempts is interrupted. Undue reprimands on the part of a parent may produce maladjustments in the child. Difficulties often arise between children within a family: jealousy and rivalry, for instance. When a child gets a younger sister, his relationship with the parent may be upset through jealousy and the newcomer may become a barrier between him and his parent. Sometimes this situation can be improved by giving the older child some responsibility in caring for the younger. A youngster whose older brother was an Ensign in the Navy, and whose family always talked about the Ensign, felt pushed off into a subordinate role and developed symptoms of maladjustment.

Continuance of activity that should have been dropped. Childish habits or emotions sometimes continue into adult life. A common instance is the parental fixation, wherein the child becomes very dependent upon the parent and continues to be so even after reaching maturity. The writer knew a college Freshman whose mother combed his hair every morning. Many of these cases arise from overprotection on the part of the parent. A woman married unhappily to please her family and then centered her life around her son. She waited on him, decided on his educational program, and took care of all his daily responsibilities as far as possible. When he went to college, the whole family moved to the college town so that she could take care of him. He developed an egoistic tendency with no initiative and lost his first job because he had to have everything explained to him in detail. Another common difficulty comes from getting into a blind-alley job and remaining there so long that one develops inertia about leaving, even though one is dissatisfied. Again, a person who has been widely recognized because of athletic prowess expects the plaudits of the public and friends to carry over into other pursuits, even though he cannot achieve distinction in them.

Very difficult decisions. Frustration may occur if one is compelled to make a decision that is extremely difficult. This principle has been used to create experimental neuroses in animals. A white rat is placed on a platform and taught to jump horizontally toward a screen. He is then presented with two screens, on one of which is a circle and on the other an ellipse. If he jumps toward the circle, he goes right through a paper screen into a box containing food, whereas if he jumps toward the ellipse, he hits a solid surface, bumps his nose, and falls back into a net. The rat readily forms the habit of jumping to the circle when stimulated by a blast of air from the rear. Of course, the circle is sometimes on the right and sometimes on the left so that the habit will not be based on mere position. Then the experiment proper begins. The figure which he is to avoid becomes less and less clearly elliptical on successive trials. Finally, the circle and the ellipse differ so little that the rat is unable to discriminate between them. However, he does have to make a decision because there is a blast of air behind him and he must jump. Under these circumstances many rats develop neurotic symptoms such as "freezing" or going into a state of coma. This illustrates under laboratory conditions the way that difficult or impossible decisions may produce frustration and maladjustment. Identical mechanisms operate at the human level, although in most cases there is a slight preponderance of values for one alternative so that decision is possible. Situations do arise, however, that are analogous to the imperceptibly different circles for the rat. A man is torn between the patriotic impulse to enlist and his responsibilities to wife and children. It may be extremely difficult to decide whether to marry now and forego three years in Law School or *vice versa.* Mental difficulties may result from such situations. Similarly, having too many things to do at once—simultaneously being given just too many directions—will result in confusion and frustration.

Methods of Meeting Barriers

Direct attack. We will now note some of the ways in which people meet the barriers that intervene between them and their goal. A normal method is the direct attack on the barrier—the individual simply tries to crash through. A person who is handicapped by deafness may learn lip-reading as a direct method of meeting the situation. A student who gets into difficulty in some academic situation, stays up all night and studies for the examination. If there are conflicting alternatives, it may be possible to find a way to compromise.

Substitute activities. When a person is blocked, he may do something else that is not entirely satisfactory but serves to some extent as an outlet or compensation. The person of small stature drives recklessly because he can assert himself in pushing on the accelerator even though he cannot achieve much in physical competition. A person does not have very much to say but says it in a loud voice. It has been suggested that Hitler's thwarting in Art School led to compensation in the form of his paranoid seeking for power. The motives back of these compensations may be quite unconscious. The kleptomaniac who steals as a compensation for being repressed in the family does not know why he takes the things. There may be, on the other hand, substitute activities that are satisfactory, provided the resulting emotional pattern is adequate. A student may be unsuccessful in school and will quit school and go into business where he gets a certain amount of authority and his emotional adjustment, on the whole, is satisfactory.

Another type of compensatory activity is aggression. When a person is frustrated, he takes it out on somebody. The typical instance is the school bully who is several grades retarded because of intellectual dullness but gets some outlet in pushing the younger children around. Aggression toward a frustrating object is natural anyway. Regression, where one may slip back into habits of childhood, is an occasional type of substitutive activity. An inductee who was being examined at one of the induction centers with a performance test where he was to follow certain directions with a hammer, a screwdriver, and a wrench, was making a poor showing and evidently was frustrated by his incapacity. He suddenly picked up the hammer used in the test, and began to pound vigorously on the table. A moment later he burst into tears, obviously regressing to an earlier mode of behavior.

Still another type of substitute activity is sublimation, in which, rather than behavior being a substitute for some deficiency, it is a substitute for behavior that is more or less tabooed by society. A typical case is a woman who is thwarted in her sex life and goes in for poetry or reads romance. These activities are socially acceptable but are not an entirely satisfactory solution for the individual. Sex and rage are frequently sublimated.

Evasion. Sometimes instead of finding a substitute for the goal which is blocked, one side-steps it entirely. This is a negative substitute activity, of which a common type is the resort to fantasy or daydreaming. The youngster who does not understand his arithmetic sits and looks idly out the window. The middle-aged person who is blocked in a social career dreams of the good old days when she was young and handsome. Incidentally, it is possible to buy such dreams readymade in the movies or in romantic stories. Some fantasies often take a hero form—the conquering hero gets reprimanded in school but dreams of running away and becoming famous in the Orient; the suffering hero imagines himself studying so hard that he ruins his eyes. Then there is the type that dreams about "He says," "Then I'll say," figuring out a whole dialogue in which he gets an outlet, although he never does actually say these things. Sometimes a minor illness constitutes a type of evasion—the child who becomes too sick to go to school or the student who gets a severe headache just before an examination.

Rationalization—giving plausible but fallacious reasons for behavior—is a particular form of evasion that deserves mention. A lot of this is done in normal life. The student ought to stay home and study but goes to the movies and argues that after all he needs the relaxation and will be able to study more effectively when he returns. A man buys a car, actually because he is jealous of his neighbor, but convinces himself and his friends that the old one gives him such poor mileage that the new one will be a good investment. A common type of rationalization in maladjusted cases is the "sour grapes" mechanism. The student who is not doing too well in scholarship concludes that after all, it would be better to be popular with his friends than to make Phi Beta Kappa.

Projection is a type of evasion in which one's shortcomings are mitigated by blaming someone else. The poor student attributes his failure to ineffective instructors, and the other driver is always to blame in an automobile collision.

Retreat. Another way of meeting barriers is to turn completely away and go in the opposite direction. This may take the form of actual migration—going to some other place and getting completely away from things associated with the frustration. A parent whose only child dies sometimes refuses to go back into that house to live. Some persons get their retreat through alcoholic stupor. Daydreaming, a form of evasion, might also be considered in this connection. Often this running away from things is abetted by parents who keep the child secluded for fear of disease or social contamination so that his seclusiveness gets habitual. Sending a child to his room as punishment can develop this form of behavior.

Carry-over from earlier experiences. Sometimes a minor mental maladjustment is due not so much to a blocking of a goal-directed activity as to a carry-over from some earlier experience that has left a trace on the individual's behavior. It may go back to some traumatic emotional experience in childhood. Many phobias originate in this way. A man had claustrophobia—the fear of being in a closed place—so that he always has to sit near the door. Analysis revealed that as a child he had been locked in a closet for punishment and had, at the time, been bitten by a rat. This violent emotional experience was enough to produce the subsequent fear of closed places. Another man developed a similar tendency because as a child he had once been playing a game in which he got under a rug and he had nearly smothered. A man was continually obsessed with the idea that he might be seized from the rear and he always had to have his chair with its back against the wall. As a youngster he had stolen something from in front of a store, and the owner had seized him. He was not aware of the connection between this event and his present phobia, and, in fact, had entirely forgotten the event until he happened to go back to the old town and saw the former proprietor. A woman who had a fear of looking people in the eye developed that phobia as a result of a childhood experience when she peeked into a drawer where she was not supposed to look and encountered a glass eye.

Similarly, some compulsions may be traced to early experiences. A man was terribly disturbed if he had to step on cracks in the sidewalk, because once when he had been running to catch a streetcar, he jumped over a ditch and broke his leg. This had produced a subsequent fear of any kind of obstacle, even a crack in the walk. Compulsions of this sort are sometimes considered as part of the picture of psychasthenia. At any rate, the origin is often in some earlier experience of an emotionally traumatic character.

Summary

Diagnosis of mental disorder always involves a clinical interview. It is necessary to establish rapport at the outset. The physical situation should encourage the client to be relaxed and comfortable. The interviewer should appreciate the fact that he is dealing with a whole person and should be flexible in adjusting the conversation to follow up any leads which may occur. He may also secure some diagnostic material from careful observation of the client during the interview. The case history is another routine procedure which usually includes family history and personal history.

Clinical tests are widely used in the process of diagnosis. These include intelligence tests and personal inventories in which the client checks items regarding himself. Association tests present stimulus words to which the subject responds with the first word that occurs to him, and a high incidence of atypical responses may be diagnostic. Projective techniques induce the client to project his feelings or attitudes into a situation which is presented. These may utilize interpretation of pictures or ink blots.

Psychoanalysis, otherwise identified as Freudian psychology, presupposes three egos and conflict between them. The biological urges are kept in check by the more respectable ego. This conflict often leads to suppressed complexes, which sometimes drag under, as it were, certain items that are associated with the complex, and produce amnesia. Sometimes the complex gets an outlet through some associated channel as, for example, through a dream. The psychoanalyst follows up trains of association in an effort to determine the actual complex with a view to therapy.

The foregoing techniques are used to diagnose and classify mental disorders. In general, there are two types of causes—predisposing and exciting. The former cause is very frequently heredity. There is ample evidence that mental disorder runs in families. Exciting causes which touch off the predisposition include emotional shock, physical illness, and overwork.

A number of disorders are psychogenic in the sense that they do not stem from any obvious physical cause. Schizophrenia is one of the most common of these. It is characterized by a shut-in personality. In the simplex type the individual is badly retarded and resembles a moron. In the paranoid variety he has delusions of persecution or grandeur. The hebephrenic is a very regressive type. The catatonic type is characterized by a waxy flexibility in which he will maintain an uncomfortable posture. Manic depressive insanity involves pronounced excitement and overactive behavior or profound depression. These symptoms may alternate with a normal period in between, or there may be a recurrence of one phase with a normal interlude. Paranoid personality involves delusions of persecution or grandeur much like those of schizophrenia, but a little more logical. Constitutional psychopathic inferiority is characterized by general inadequacy and a hair-trigger type of emotional instability. Melancholia comes on in middle life with a very severe depression and may result in suicide.

Physiogenic disorders include paresis, which is due to syphilis and involves delusions of grandeur and euphoria, which is an excessive feeling of well-being. Senile dementia develops in old age and involves some delusions and disorientation but no serious social consequences. Among the toxic psychoses is delirium tremens produced by alcoholic poisoning with its characteristic visual hallucinations of moving objects usually snakes or insects. Traumatic psychoses include head injuries with resulting acute fatigue, excitability, and sensitivity to noise. Epilepsy may be classed as a physiogenic disorder although its cause is not entirely clear. It is characterized by convulsive episodes. In *grand mal* these episodes are severe, whereas in *petit mal* they are only momentary.

Psychoneuroses are less serious than the psychoses and usually do not need institutional treatment. Neurasthenia is characterized by a chronic fatigue. Psychasthenia involves a morbid attention to detail or a scrupulousness. Hysteria takes two forms: in the anxiety type the patient goes to pieces, shows emotional crises, sometimes suffers from disassociation, and runs about aimlessly; the conversion type of hysteria is characterized by apparent physical symptoms which have no physical basis—for example, anaesthesia of a certain area of the skin, or paralysis of some muscle group, or even blindness.

Many minor mental maladjustments result from a conflict between what one can do and what one wants to do. Much behavior is goal-directed, and if any barrier intervenes, maladjustment may result. Barriers which may intervene include the following: lack of capacity; change of activity; interruptions of life activity; very difficult decisions.

Normally these barriers are met by a direct attack, but sometimes less satisfactory adjustments occur. One of these is use of substitute activity—a child who is badly retarded in school may become a bully. Sublimation is another substitute, as for example, securing from the movies or cheap fiction romance which is otherwise unattainable. Evasion is a mechanism for merely side-stepping the goal. This may often take the form of fantasy or daydreaming, or rationalization, where one evades the problem by giving some plausible, but fallacious reason for behavior. In projection the blame is placed on someone else, and retreat involves going completely away from the goal. Other difficulties arise by a carry-over from earlier experiences which should have been outgrown or forgotten. Many phobias arise from a childhood experience or severe emotional shock.

11

PSYCHOTHERAPY

Difficulty of Therapy for Major Mental Disorders

THE QUESTION NOW arises as to what can be done about these typical mental disorders and minor maladjustments. The solutions lie in the field of psychotherapy because, for the most part, the treatment of these mental difficulties is mental in character, although in a few instances physical treatment has yielded positive results. In general, the prognosis for the major disorders is not very favorable at the present time. It is impossible, for example, to remove delusions by arguing with the patient. The delusion is his protection, and any alternative would be destructive to his way of thinking. The only help that can be given him is to keep him where he cannot get into trouble. Sometimes a person with a delusion will kill a suspected persecutor, or a sadist will commit murder. Under hospital conditions, hydrotherapy and drugs may be used to quiet the patients temporarily. The hopelessness of the major disorders is especially clear in the case of the psychogenic variety where there is little indication of causation. It should be noted, however, that paresis was once considered a psychogenic disorder, but its physical cause was subsequently discovered. The same thing may happen with other disorders that are now classed as psychogenic.

Experimental Efforts at Treating Major Disorders

Shock therapy. There have been recent efforts to apply certain drastic treatments of a medical character to the psychoses. One of these techniques is shock therapy, in which the individual is given a profound physical shock. This may be done by administering insulin, or metrazol, or electric shock, or even by freezing the patient. The experience is often severe enough to render the patient unconscious, but in some instances it appears to be helpful. Results for four groups of patients[1] treated with three types of shock therapy appear in Table 12. The entries in the body of the table indicate the per cent of recovery.

TABLE 12

Effects of Shock Therapy, Giving Per Cent of Recovery *

Group	*Insulin*	*Metrazol*	*Electric*
I	56%	43%	20%
II	20	28	—
III	11	19	43
IV	10	7	15
Total	44%	30%	18%
Number of Cases	195	363	61

* Kaiser

Group I comprised the least serious cases of less than a year's duration, and cases in Group IV were of over three years duration. Some recovery is indicated for all types of treatment and for all degrees of severity of the psychosis. The total indicates the percentages of the total group that recovered. Forty-four per cent of the insulin patients recovered, 30 per cent of the metrazol and 18 per cent of those treated with electric shock.

Such treatment is rigorous and might conceivably have harmful effects which would more than outweigh the possible psychotherapy, however, no reports of such harmful effects have been published. Moreover, one case has been reported where the patient received 96 metrazol and 152 electric shock treatments with no apparent detrimental effect and with some mental improvement.[2]

Patients often dislike the treatment after they have had one shock. The patients become very much afraid of electric shock therapy especially. Under such conditions it sometimes is desirable to induce sleep first by sodium pentothal and then apply the shock. The amount of resulting convulsion depends on the stage of sleep in which the shock is applied. The patient then is calm and undisturbed when he awakes.[3]

---

[1] Kaiser, N. W., "Review of Results of Patients Treated With Insulin, Metrazol and Electric Shock Therapy at Toledo State Hospital," *Quarterly Bulletin*, Ohio Department of Public Welfare, 1942, 19, No. 3.

[2] Perlson, J., "Psychologic Studies on a Patient Who Received 248 Shock Treatments," *Archives of Neurology and Psychiatry*, 1945, 54, 409–411.

[3] Rubinstein, H., "Sleep-Electro-Shock Therapy," *Science*, 1945, 101, 430.

It is not clear just how shock therapy operates. It has been suggested that it is merely a severe attention-getting device or "punishment."[4] The patient lives in a dream world, and "don't bother me" is his best method of adjusting to problems of living. He even falls into a catatonic stupor as a way out. However, the shock is too great to be ignored, and he cannot continue with this congenial inner life. If he resumes his catatonic housekeeping, he will get another devastating shock and so he tends to come out of this schizophrenic retreat.[5]

Lobotomy. Another technique that has aroused some interest in recent years consists of cutting some of the connections in the frontal portion of the brain. This is called pre-frontal lobotomy. The original technique involved cutting out cores of white matter in that region, but now it is a process of cutting through some of the long white fibers on both sides, presumably rendering the entire pre-frontal region functionless. Some investigators claim that it is a matter of cutting the connection between the emotional and the ideational experiences. Usually this treatment is applied only to cases that are hopeless according to present standards, because the operation is drastic and sometimes fatal. Estimates as to its effectiveness vary. In one summary of seventeen published studies which classified the results as good, fair, or poor, lumping all the data together for 600 cases, 47 per cent were reported as showing good results, 24 per cent fair, 24 per cent poor, and 5 per cent were fatal.[6] The authors of the above summary also present results of their own experience with sixteen chronic schizophrenics. Most of them had had convulsive therapy without much benefit. They were evaluated before and after treatment by a behavior chart, on which the nurses and attendants rated them on such things as personal appearance, sleep, appetite, sociability, activity control, noise disturbance control, care of property, self-entertainment, cooperation in routine work, initiative when alone and under supervision, and willingness to follow directions. The average total rating, that is, the average of the rating on all the characteristics for sixteen patients before operation was 1.25 and the post operation rating was 2.53. The critical ratio was 3.37 which indicates that the difference was in no sense a statistical accident. There is, of course, an element of suggestion that might load the rating somewhat. The nurses and attendants might be expecting better results after the operation and rate accordingly.

---

[4] Klein, D. B., *Mental Hygiene*, pages 146 ff. New York: Holt, 1944.

[5] For a review of the literature on shock therapy, see Stainbrook, E., "Shock Therapy, Psychological Theory and Research," *Psychological Bulletin*, 1946, 43, 21–60.

[6] Schrader, T. J. and Robinson, M. S., "An Evaluation of Pre-Frontal Lobotomy Through Ward Behavior," *Journal of Abnormal and Social Psychology*, 1945, 40, 61–69.

However, it is doubtful if the suggestion would account for the entire difference. No one was cured, but some did make a much better institutional adjustment. Another report presents some cases in which the results were encouraging: the study involved 136 patients with miscellaneous disorders, who were treated over a six-year period.[7] The best results were obtained with obsessive tension states and with involutional depressions. Of the 136 cases 27 were subsequently employed regularly in such jobs as clerk, telephone operator, or tool designer, 16 were employed part-time or were studying, 39 were keeping house, 30 were at home but inactive, and 13 were still in institutions.

Another study gave tests before and after lobotomy including performance tests (intelligence), arithmetic, cancellation, substitution, and naming colors. In the various tests, the improvement was from 15 to 75 per cent, but 5 to 65 per cent were worse. The results were on the favorable side, but not startlingly so.[8] Incidentally, if the difficulties were largely in the emotional sphere, little improvement in these ideational tests would be expected.

Endocrine therapy. Mention should be made of therapeutic efforts with endocrine medication. The secretions of some of the ductless glands play a role in emotional conditions and in various bodily functions. The most successful work with endocrine therapy has been done with mental defectives rather than with insane. For example, a child with inadequate thyroid secretion had an I.Q. of 50 at the age of three. Thyroid treatment was administered, and at the age of nine years and eight months, the I.Q. had risen to 90. Then the treatment was discontinued and by the age of fourteen the I.Q. had dropped back to 50 again.[9] A more extensive study of mentally retarded children who received endocrine therapy as well as some changes in diet and social aspects of their environment included 115 who had a known endocrine difficulty. Of these, 45 per cent improved in I.Q., whereas only 1 per cent of another 162 who had the same therapy although they had no apparent endocrine lack showed improvement.[10]

An occasional case is reported where broader aspects of personality were affected by endocrine treatment. A girl of sixteen became listless and apathetic, had no incentive, and was very much overweight, which was due to some malfunctioning of the pituitary gland. She was given the appropriate endocrine treatment, whereupon she lost the excess weight and became bright and alert again. Moreover, her self-consciousness and inferiority attitudes also cleared up.[11]

---

[7] Watts, J. W. and Freeman, W., "Pre-Frontal-Lobotomy," *Southern Medical Journal*, Birmingham, 1943, 36, 478 ff.

[8] Hunt, T. N., *Psychology in Use*, page 520. Edited by Gray, New York: American Book Company, 1941.

[9] Mateer, Florence, *Glands and Efficient Behavior*. New York: Appleton-Century, 1933.

[10] Gordon, M. B., Kuskin, L., and Avin, J., "Organo-Therapy in Mental Retardation Associated with Endocrine and Non-Endocrine Conditions," *Endocrinology*, 1935, 19, 532–578.

Objectives of Mental Hygiene

Having noted some possibilities of medical therapy for the more serious mental disorders, we may turn to the field of mental hygiene where psychology makes some contributions to the alleviation of the minor mental disorders and maladjustments. The interest in this field began about 1908 with Beers' book, *A Mind That Found Itself.* This book recounts the experiences of a man who became insane and subsequently recovered. It aroused a lot of interest, and led to the formation of a society for mental hygiene and the beginnings of psychotherapy.

The objective of mental hygiene is to develop the whole personality in a well-integrated fashion and to help the individual adjust himself to reality as he encounters difficulties or meets frustrations. It attempts to eliminate excess emotions, which waste disorganized energy, and to prevent extremes of behavior. It also is concerned with the social adjustment of the person so that he can get along with people. The procedure followed, of course, depends upon the individual case and, as for any other type of disorder, diagnosis precedes treatment.

Suggestion

Direct and indirect. One of the psychotherapist's stocks-in-trade is suggestion, which involves presenting an idea and keeping it vividly before the individual until it leads to action. Suggestion as a technique is ubiquitous and has been discussed elsewhere in the book. Its brief mention at this point does not reflect its unimportance. Direct suggestion is used in cases of mental maladjustment where it is necessary to change the patient's attitude or to build up a particular idea—for instance, that it is safe to sit in a crowded room. Assurance that "this will clear up" is often sufficient to take care of a difficulty. To cure some obsessions it is necessary merely to build up the opposite idea—that the client *can* look people in the eye after all.

Many times it is better to employ the suggestion indirectly rather than directly, because the direct approach tends to arouse opposition. It is preferable to discuss details of the proposed after-dinner speech rather than tell the patient that he is getting more self-confidence or to point out that the client saved time by changing the tire himself rather than assure him that he is overcoming his obsession about dirty hands.

---

[11] Lurie, L. A., "Endocrinology and the Understanding and Treatment of the Exceptional Child," *Journal of the American Medical Association,* 110, No. 19 (May 7, 1938) 1531–1536.

Special mention should be made of therapy in connection with religious practice. The mere atmosphere of a shrine may cure a patient with hysterical paralysis, through the medium of indirect suggestion. Various organizations and cults which do faith-healing are frequently successful with cases which are amenable to suggestion. The difficulty with faith-healing in general is that it is done without diagnosis. For a limited group of patients, faith may be the very best thing that could be prescribed, but for others it is, at times, unsuccessful and even criminal. In general, the success of such procedures does not average very high. A church committee made a systematic check on the results of a faith-healer in Vancouver. They located 350 people with a wide range of diseases whom he had treated. Five were cured, 38 showed some improvement, 212, non-improvement, although they had been declared cured previously, 17 were worse, and 39 died.[12]

The psychologist, naturally, must be discriminating when he uses suggestion. As a matter of fact, it is routine technique before attempting psychotherapeutic measures to be sure that no medical symptom has been overlooked. Therefore, psychological clinics request a medical report prior to undertaking treatment of a case.

On occasion, it is desirable to have the patient administer the suggestion himself—for example, repeating a phrase like, "I feel better," while he is falling asleep. This auto-suggestion may not be as powerful as that supplied by an external person but sometimes it is helpful.

Hypnosis. It may be necessary for the psychotherapist to resort to the more extreme condition of suggestibility that is found in hypnosis. A patient can be brought into this state by getting him relaxed and talking to him monotonously about sleep, repeatedly suggesting that he is going to sleep, that his eyes are heavy, and so forth. There is nothing occult about it, and much depends upon the patient's ability to concentrate on the idea of sleep. Children and mental defectives are more difficult to hypnotize because of the more flighty character of their attention. Hypnosis has been used effectively for therapeutic purposes, for example, in connection with addiction to certain drugs. Where the patient is anxious to recover from the addiction but is unable to cope with it himself by voluntary effort, he may be helped by posthypnotic suggestion. This is suggestion given during the hypnotic state which carries over and is followed after awakening. The therapist hypnotizes a drug-addict, telling him that tomorrow he will take five grains less of the drug, and then wakes him. This posthypnotic suggestion, supplementing his own voluntary efforts to reduce the dosage, may be sufficient to achieve that end. The amount can be reduced gradually in that way. It is not feasible for narcotic addicts to stop abruptly, although that is ordinarily the best way to break a habit, because of the physiological reactions involved.

---

[12] Ekdahl, Naomi M., *A Study of Religious Fanaticism*, page 123. Ph.D. Dissertation, Ohio State University, 1925.

Emotional Reconditioning

Some mental maladjustments result from unfortunate emotional conditioning. In such cases reconditioning may be an effective therapy. Stammering is a case in point. The speech muscles are especially vulnerable because they are more social. A boy whose speech was blocked when a brutal father yelled at him developed a tendency to stammer in any noisy situation. Reconditioning took the form of having him talk in a quiet situation and then elevate his voice until he was making a lot of noise himself. A youngster who stammered in most situations could, nevertheless, talk easily to a horse or dog. He was encouraged to talk to horses and occasionally answered a question by a groom or a rider thus effecting a transition to normal speech. A student who could sing without difficulty but otherwise stammered was helped by singing football songs that had a few spoken words interspersed. Incidentally, there are many systems or schools for treating stammering, most of which depend on distracting the individual's attention, which breaks up the emotional attitude and relieves tension. Some schools make him watch his breathing carefully, and others tell him to visualize something before speaking. All of them tend to minimize the emotional aspect and self-consciousness.

Sublimation or Substitution

It was noted earlier how a frustrated person may resort to sublimation or substitute activity. Frequently, this is of an unwholesome sort, but there are occasions when the psychotherapist deliberately suggests such a practice. The client is apt to hit upon an unsatisfactory sublimation, but the counselor may be able to suggest a salutary one. For instance, if the social situation itself cannot be fixed, as for a person who has been jilted, the client may be encouraged to seek an interest in some other field involving a certain amount of emotional outlet, such as art or altruistic work. A youngster was a chronic truant in the springtime, although he had no trouble during the rest of the year. He simply could not stay indoors, but took to the woods in the spring. He was detailed to collect specimens for the school in the course of his wanderings. It was, of course, necessary to bring in the specimens, discuss them, and tell where he secured them, and in the process, he spent more and more time in school. The collecting served as a reasonable substitute for his basic drive to get out in the country at that time of year. Again, a child in a play therapy situation with a sympathetic supervisor may find a security that was lacking at home.

Reasoning

For some cases, it is possible to approach the difficulty in logical fashion, show the client just how the trouble originated and what ought to be done. This method depends on the amount of insight which the client has. The procedure was used quite a bit in connection with neuroses arising from combat experiences. A report on the British Army indicated that 10 to 15 per cent of all casualties were mental, and that if treatment was given near the front lines before the difficulty had become thoroughly fixed, 60 per cent of these soldiers could be returned to combat duty.[13] The treatment often took the form of a reasoning process after the real traumatic cause had been uncovered. Frequently, the soldier could not tell what actually had occurred, but showed the usual symptoms of instability and profound emotional disturbance. He was given a small amount of sodium pentothal, not enough to produce anaesthesia but sufficient to make him talkative, and then was able to recount what actually had happened. Sometimes, the physician helped set him off by shouting, "Fighters at twelve o'clock!" or by making a statement that he thought might be pertinent to the traumatic situation. If the soldier could be induced to talk enough to reveal the experience, which he could not recall in the ordinary waking state, the information could serve as the basis for a rational approach. For example, two soldiers jumped for a fox-hole simultaneously and only one of them made it. The real basis for the survivor's neurosis was worry over the fact that he had prevented his companion from getting into a safe place. This was discovered under the drug, and when the effect of the drug disappeared, the therapist discussed the matter with the soldier. It was explained to him what had happened and that the result actually was not his fault. Such a rational approach sufficed to clear up the symptoms.

[13] Rees, J. R., "A Brief Impression of British Military Psychiatry," *Bulletin Menninger Clinic*, 1944, 8, 29–35.

Environmental Influences

Change of context. Factors in the client's environment may have a therapeutic effect. Sometimes, it is merely a matter of a change of environment—just any change. It seems plausible enough that the sea air on the cruise has a beneficial effect, but the real therapy is getting away from whatever local circumstances were causing the trouble. Sometimes, it is a matter of migrating to an area where there is less prejudice against the individual's particular group. A common practice is placing maladjusted children in a foster home when the original home is untreatable. For example, a child with a psychopathic domineering father, needed more maternal affection and had an interest in pets that offered some therapeutic possibilities. A foster home with a motherly woman out in the country worked wonders for the youngster. For many delinquent children who are referred for observation to some diagnostic agency the recommendation of the agency is placement in a foster home.

Music. There have been some efforts to use music in a therapeutic fashion, although little has been reported on the actual success of this treatment. The music presumably serves as a distraction from other things that are worrying the individual and also, through a process of association, calls up pleasant memories. Normal people find music very effective as an associative medium. A certain tune calls up the Junior Prom, or a summer at the sea shore. There have been preliminary reports of success with music for some military psychoneurotic cases.

Occupational therapy. There are possibilities in occupational therapy for mental adjustment and improvement of the patient's attitude. He at least accomplishes something tangible in making objects of various degrees of complexity. The result is more favorable if the task is not mere busy work but something that actually has utility. The patient gets a feeling of accomplishment out of this, and success experiences usually have a salutary effect.

School environment. With youthful patients public school personnel may cooperate in the therapeutic program. Sometimes it is merely a matter of proper placement. The child is handicapped in some particular subject and needs to be assigned to a group of similarly handicapped pupils for a special program, or he is too bright for his group and should be accelerated. The school's extracurricular opportunities may be helpful, particularly for the socially inhibited child. The teacher's friendly personality is an important factor, especially for a child who is insecure at home. The teacher may become somewhat of a parent substitute. Many schools now have a school psychologist. This person does a modicum of psychotherapy or is the liason with an outside therapist. In the treatment of young delinquents who have been examined by a clinic or an observation home very frequently the recommendation includes some suggestion pertaining to the school. In one large city 94 per cent of the recommendations related to the school, and in another city this figure was 52 per cent.[14]

Therapy by Psychoanalysis

The general approach of the psychoanalyst to mental adjustment problems was discussed earlier. Difficulties are traced back to suppressed complexes, and these suppressions come out in the form of worries, phobias, hysterical disorders, or even hallucinations. The central feature and main purpose of the treatment is to relieve the repression. Once the difficulty has been located, the individual goes back over the previous experiences and talks about them—brings the complex to the surface, so to speak—thus removing the repression so that the symptoms clear up. This procedure, however, may relieve symptoms without furthering adequate social adjustment. If the difficulty is due to the fact that one wishes some rival to be nonexistent, talking about it may remedy amnesia regarding that individual's name and telephone number, but it will not alter the fact that he is still a rival. The most the psychologist could do would be to contrive to get the client interested favorably in somebody else.

The actual procedure of psychoanalysis is much more extensive than the description indicates. A long process of interviewing is required in order to effect a diagnosis and locate the complex. It involves following up trains of free association starting, sometimes, with items in a dream which the client recalls, or using hypnotic age regression.

Therapeutic Interview

The interview itself may be regarded as a therapeutic instrument. Some therapeutic devices may be applied in the course of the interview—reasoning with the client, suggestion, sublimation, or building up an idea opposed to the one which is bothering him. It is well, however, to discuss the interview in its own right. It comprises a face-to-face situation, designed to alter behavior and change attitudes.

There is no sharp line between the diagnostic interview and the therapeutic. Frequently, the same session may shade from one to the other. A difficulty appears and as it is discussed, the client's point of view begins to take shape, and the interviewer may be able to start doing something about the difficulty. Before the diagnostic aspect is completed, the client may have some insight into the whole problem.

---

[14] Healy, W. and Bronner, A. F., *New Light on Delinquency and Its Treatment,* Chapter 10. New Haven: Yale University Press, 1936.

Some features that were brought out as desirable in the diagnostic session are equally important in the therapeutic interview: the setting should be pleasant and comfortable, so as to relieve tension; rapport is important because so much depends upon the confidence of the client in the counselor—free and frank discussion is necessary if real insight into the problems is to be achieved.

We will discuss three types of interviews which, however, are not sharply defined and, in the practical situation, may overlap. The counselor varies his approach according to the type of case and may even change his procedure in the midst of an interview. However, if he is using a combination of directive and nondirective interviewing, it is better to begin with the latter; otherwise, it will be difficult to achieve at all. If the interviewer begins by telling the client things and giving him advice, and then wishes to shift over to a procedure in which the client does most of the talking and unloads his problems, it is very difficult to make the change, for it is easier for the client to continue to listen once he has been started in that direction.

Directive or advice type of interview. A common procedure in interviewing is to give the client advice or some recipe. It is similar to the procedure followed by a physician who diagnoses the ailment and makes a prescription. This type of interview is essentially counselor-centered, in other words, the counselor knows best. Sometimes it is the very best thing for the client. The counselor selects the goal, structures it, and makes the client take that direction. He may order or forbid something or persuade the client to take some particular course of action. These decisions are more apt to be helpful at the intellectual level rather than at the emotional level. The student comes to the counselor with the statement that he is failing a certain course and cannot seem to study very well. They talk it over, the student takes some diagnostic tests, and then the counselor proposes the solution, such as a time budget. Or again, a college student from the country states the general problem that he wants to be more like the city boys. After some little discussion of his background, his recreational pursuits, and social opportunities, it becomes obvious that if he took dancing lessons, he would stand a much better chance of emulating his urban classmates. The motivation is present, he follows this advice, and it solves his problem. In this type of interview everything depends on the skill of the counselor in diagnosing the problem and having enough insight into the case to realize whether the client is in a position to take advice that is given in logical fashion, or whether there is some deep-seated emotional difficulty which requires some other type of therapy.

Cathartic interview. For some cases the best treatment is the type of interview called cathartic or ventilation, in which the client is encouraged to talk himself out and get the whole business out of his system. Everyone has had the experience of feeling much better and less tense after he told somebody. As a matter of fact, he probably laid awake the night before rehearsing what he was going to say. When a thing is repressed, it is somewhat like the hollow tooth which seems serious when explored by the tongue but rather trivial when one gets a good look at it. If a worker has resentment against his boss, just talking about it relieves much of the tension. If the conflict is largely at the conscious level, the cathartic interview may shade over into the advice type of counseling. The client is worried about taxes, or food, or domestic problems, he gets the worry out of his system in discussing it with a counselor and then gets some good advice on top of that.

This type of interview is used extensively in some industrial situations. One of the larger industries has a program wherein all employees are interviewed periodically. The original purpose was to discover sore spots from the industrial relations standpoint, but it soon developed that the opportunity to talk to a sympathetic listener who would keep the results confidential provided a very helpful release for many employees. Telling somebody about a foreman who annoyed him or about some idea on which he was working which might improve his own job had an entirely wholesome effect on the mental adjustment of the employee.

Nondirective therapeutic interview. In recent years considerable attention has been devoted to the nondirective type of interview as contrasted with the directive. It will be discussed at greater length, not because it is more important than the others, but because only recently has it been used systematically and deliberately. This type of interview is client-centered rather than counselor-centered. It does not assume that the counselor knows the answers. The two parties talk about the present problems, but the past background also may come out. There is a certain amount of growth and change during the interview and the client restructures his own feelings. The emphasis is on the emotional aspect more than the intellectual. The principle technique, of course, is to let the client do a lot of the talking. Instead of asking him a series of questions, the counselor may turn his own statement back at him with a rising inflection, such as, "You really dislike the old man?" or even, "Mm-hm?" The interviewer merely shows interest in the remark and encourages the client to tell him more about that particular item. The interview may include some catharsis, because in the early stages the client is quite apt to pour out his troubles. At this stage, also, the counselor may wish to decide whether to continue with this type of interview or whether to shift over to a more directive approach. It all depends on what appears to be the prime difficulty. If the problem seems to be deep-seated emotionally and does not come out readily, it may be well to pursue the nondirective line, at least until the counselor has a fairly clear idea of what is wrong.[15]

The attitude of the interviewer is of obvious importance. It is characterized by a profound "permissiveness" in regard to the expressed feelings. In other words, the client is encouraged to talk about anything and to express his feelings about it. The counselor should not be startled by anything that pops out. He must remain deadpan because if he expresses surprise or horror in any way at something that is said, the client will immediately become defensive and this is the last thing that is desired. The counselor must be very responsive and show an interest in anything the client wishes to discuss. He also must be objective about it and not intrude any of his own prejudices. He should not blame the client nor indulge him, but merely appear to understand his experience and be willing to help him understand it himself. Reassurance is easy but it may not reassure and although he is tempted, the nondirective counselor is cautious about such a procedure. Suppose, for example, the client says, "If I get laid off this job, I don't know what to do. I'm scared." If now, the counselor says, "Don't worry," then the client believes that he is kidding him or at least has no basis for the statement. It is better to reflect the client's own feelings and say, "The prospect of lay-off frightens you?" Then the client will go on and elaborate the point a little and perhaps mention previous work experiences and alternative vocational objectives and finally work himself out of his worries. Outright reassurance would forestall this outcome.

The conduct of the interview must be in the client's hands to quite an extent. He must reach the point where he will assume responsibility for his planning. He is insecure when he comes in and he wants assurance from the counselor, but if he gets it, then he becomes all the more dependent. Almost trivial things may contribute to building up this responsibility. If he comes to the interview for help voluntarily, he thereby is accepting a little responsibility for working out his problems. Then, perhaps, at the end of the interview, he says, "Do you want me to come again?" Obviously, he wants the counselor to decide, but the latter merely says, "Would you like to come again?" thus throwing the responsibility back on the client. After a bit more conversation, he says, "All right, I'll be in Friday." At that point, he has accepted a responsibility that is comparatively trivial, but it is a step toward a broader assumption of other responsibilities.

---

[15] For a general discussion of nondirective counseling, see Rogers, Carl R., *Counseling and Psychotherapy.* Boston: Houghton-Mifflin, 1942.

During the nondirective interview the counselor must be alert for involuntary cues, such as negativism, fear, and hostility. He does this in any diagnostic situation, but may be able to locate additional spots that need more exploration. If the client goes hastily over some particular point, the point may be something that is hot, and it is well to probe it a bit further.

A major function of the counselor is to help the client get *insight* and to set the stage so that he will find a solution. He tries to help the client clarify his feelings and accept them as a part of himself rather than projecting them onto somebody else or developing a defense mechanism. The client finally comes to the point, "Well, I guess the trouble is that I've always wanted a circle of admirers even as a kid." A flying cadet finally remarked, "Maybe that's why I haven't done so well. I don't like to follow directions. I didn't like my father's directions and now this instructor reminds me of my father." In the course of the interview he had achieved a distinct insight into his problem and could handle it himself from that point on.

The temporal course of the interview starts with an initial securing of rapport and talking about anything on which the client may be talkative. If he stops, it may be well to recur to some item already mentioned so that he will continue it further. This may give him some incidental release. When finally the client makes some tentative expression about causal factors, the counselor accepts them and, as insight develops, they jointly review the conclusions and possible solutions. When the difficulty finally gets structured, the client can control it himself. What he actually wants is some type of security, and when he once sees how to achieve this he will probably do it under his own steam.

The final problem is actually reaching a decision as a result of the interview. The soldier who has been A.W.O.L. and is being counseled at the U.S.O. realizes that "I've got to go back and face the music." A self-centered young man makes the final decision to get a hard manual job for a few months just for its disciplinary effect. A withdrawn high school youth comes to realize his actual desire for friends, spends an hour telling the counselor why he is too terrified to accept a social invitation but eventually decides to go to the party.

Terminating the interview. The counselor often finds that the client wants to talk on and on and apparently likes the experience. This is especially true if there is some degree of emotional transfer to the counselor himself—the same transfer that was mentioned in connection with medical practice. The client, under those circumstances, wants to come back for more. This feature may characterize any type of interview but is especially apt to occur in the nondirective type because of the sympathetic attitude that prevails. Thus it is necessary to face the question of terminating the interview after a reasonable time. It is common practice to have an initial understanding that there will be a time limit, say one hour, and that if further interviews are necessary, other appointments will have to be made. It is inadvisable, however, to bring things to an end too suddenly. This is not so bad in the directive type because the counselor really has the responsibility, but in the nondirective interview, it should work out so that if possible the client feels that the time is about up anyway. This often can be achieved by reminding him a little in advance that the hour is approaching. When he has aired his problems up to a definite point, he usually does not need a formal dismissal. Sometimes the counselor can review the high points and encourage some tentative decision, and then they break off for that particular occasion. The time limit has a further salutary effect in that one is inclined to make hay during that period. In quite a different connection it was found that a committee undertaking a standard task did it just as effectively and more expeditiously when working against a time limit. Toward the end of the nondirective interview or series of interviews, when the case is approaching a satisfactory conclusion, and the client is talked out, as it were, the final step is his—"I'll take charge of myself." He realizes the decreasing need for help and comes to the conclusion that he will take over from now on. The counselor merely indicates his availability for further interviews if he is needed, but avoids telling the client that he thinks he might as well quit now.

Notes and records. The counselor always has a problem as to how detailed a record he should keep. In taking a case history a routine form such as has been mentioned earlier is used. This record is already structured and often chronological, so that it is a matter of merely going through the items on the blank and getting the answers. In many cases, however, the records will be unstructured, particularly in a therapeutic situation. Here, the notes will be a running account of information that has been gathered, beginning with a certain problem and working on just as the information comes out. It is possible to proceed in this way and still structure the final record, if desired, by writing at different places on the blank. It is very undesirable, however, to cut the client off at some particular point for the sake of a systematic record. It is logical enough to say, "No. I'm not ready to discuss that yet. Tell me about—" But this interruption may miss an opportunity to get something that is very important and may not come to the surface again.

There is some argument as to the advisability of taking notes at all. Some counselors prefer to rely on their memory and dictate notes later. In a long interview this is of dubious effectiveness because of the limitations of memory. If he is properly handled, the client seldom objects to the counselor taking notes. Sometimes he wonders where they are going to be used and actually asks "Who else is going to see those?" or "What are you writing down?" The counselor merely says, "You don't mind if I jot down a few things as we go along, so that I can keep track of what we do from day to day?" which usually satisfies the client. Some counselors take the notes in an apparently offhand fashion, much as if they were doodling. This procedure seems less dangerous from the client's point of view.

Group Therapy

With the increasing case load experienced by psychotherapists, it is natural that they should consider the possibilities of group methods. The situation is analogous to the use of group tests instead of individual tests for the purpose of conserving time. Several types of group therapy have been employed. In one variety persons who are known to have some common problems are brought together and talked to by the therapist without any active participation on their part. Another kind of group therapy, often applied to children, involves merely social interaction such as play, and the give and take of the play situation, with a little guidance from the supervisor, has therapeutic value and changes undesirable aspects of personality. The type which is receiving the most attention is that in which the group actually gets together and talks about their common problems with a certain amount of guidance by the therapist. His technique varies according to whether the group has some initial cohesiveness or whether it is just a motley crowd. If he knows that they already have some common problems he starts the discussion along those lines; otherwise he may ask a few of them to state their personal problems. Or in advance of the session they are asked to jot down on paper some problems which are bothering them. At the initial session the purpose is explained: "What we are going to do here is talk over matters that are troublesome to us." It is pointed out that no one has to talk unless he wants to. Usually, however, someone starts it. In psychotherapy with army groups the session usually began with gripes. There are even instances in which a stooge is planted in the group to open up certain topics if nothing else happens and to chime in with some alleged experiences of his own if the discussion seems to bog down. Once a topic is discovered which affects several of the members they usually begin to swap experiences. Out of this give and take some who need it gradually develop insight into their adjustment problem much as they would have done in interviews with an individual counselor.

The therapist in a group situation generally follows techniques similar to those described earlier in connection with nondirective interviews. When necessary he restates the feelings expressed by some member of the group which leads the members to continue further in the direction of expressing such feelings, or he may go so far as to point out some common feature in a number of their comments: "Several of you seem to be bothered by rivalry with a brother or sister." The therapist may contrive to get a resistant member to participate in the discussion. He may, at the outset, merely restate this resistance: "You feel it hard to express your real feelings in a group like this." A little later he may suggest more specifically: "A number of us have told how we felt about that; now maybe *A* would like to tell us a bit about her experience in that line." Throughout all this the therapist tries to show a warm feeling for the problems brought out by the members with the permissive atmosphere that characterizes nondirective techniques. Even though an individual does not participate very actively in the discussion he may obtain some relief merely from hearing feelings like his own expressed. It is much better, however, if he can be induced to participate.

Group psychotherapy requires a lot of time, and usually the group meets in session after session. The therapist, or an assistant, keeps records of all that transpires, and in such records, individuals may show marked improvement in the course of the sessions. For example, a young woman initially mentioned shyness when writing out her problem. She scarcely spoke of it at all until about the seventh session of the group. Then she volunteered that her parents didn't let her have the music lessons that she wanted and from that point she went on to indicate that they treated her like a baby. Presently she heard other members of the group expressing hostility toward their parents, and then she began to express her own resentment and to revolt a little more openly. She gradually developed more independence, had her father stop calling for her after the meetings, began to smoke in front of the family instead of secretly, and ultimately developed a self-confidence that carried over into her regular work. The underlying mechanisms in this type of therapy are the same as those in the individual type.[16]

A technique which is sometimes introduced into group therapy is psycho-drama (page 248). This is a diagnostic technique but, as in so many other cases, the diagnostic aspect may shade over into the therapeutic. Members of a small group are encouraged to act out bits of drama of their own choosing, playing roles which they themselves select. In the process some members obtain a salutary emotional release. A person who is repressed in his personal life may, in a dramatic situation, contrive to take a role in which he dominates somebody else. This gives him a little emotional outlet and has therapeutic value. This particular aspect of dominance is sometimes implemented by arranging the stage for the drama on two different levels. The person who acts on the upper level naturally can do more dominating.

Therapy Applied to Close Associates and Relatives

Many times when a child is brought to a psychological clinic, the staff finds it necessary to work on the parent rather than the child. The best parents, generally, are those who are well-adjusted themselves. This may be more important from the present standpoint than whether they are well-informed about child care. A study of fifteen neurotic children showed that 67 per cent of the mothers were also neurotic, and in half of the families there was marital discord.[17] A child that sees a good deal of bickering between his parents comes to take it as a matter of course and develops a cantankerous attitude himself. A mother with poor sex adjustment of her own teaches her daughter a puritanical attitude that makes the latter's adjustment difficult. A good counselor often resorts to nondirective techniques with the parents, who otherwise might get defensive about their own behavior. If parents have sufficient insight, they may be brought to the point of clearing up their own difficulties, which will be reflected in better adjustment of the youngsters in the home.

Better insight on the part of parents. Even interested and well-intentioned parents promote maladjustments on the part of the child. Perhaps they have "read a book" about children and experiment unwisely. A more frequent difficulty is overprotection on the part of the parent: a woman who made an unhappy marriage becomes extremely fond of

[16] For an account of an effort to evaluate group psychotherapy and a few references see Peres, H., "Investigation of Non-Directive Group Therapy," *Journal of Consulting Psychology,* 1947, 11, 159–172.

[17] Karlin, E., "The Neurotic Child," *Smith College Studies in Social Work,* 1930, 1, 93.

her child and cares for it excessively until it becomes altogether too dependent upon her. Another difficulty is in the disciplinary field where the child is repeatedly restrained and then condoned, thus getting too many conflicting commands. This tends to produce an emotional condition much like that of the white rat in the experimental neuroses laboratory who is compelled to make an impossible choice (page 263). Some studies of parent-child relationships have indicated that children who were rejected by their parents showed many more emotional instabilities, much more difficulty in concentrating, and more truancy when compared to a group who were accepted. They also used money more extravagantly.[18] When parental problems are uncovered, the therapy is the same as that discussed above. Maladjustment of the parent may be traced back to its source by the usual techniques, and appropriate steps may be taken. Oversolicitous or misguided efforts in the child's interest may be corrected by a rational approach. For more deep-seated emotional difficulties therapeutic interviews may be necessary. The only unique feature here is that the ostensible client is not the actual one.

Old Age Counseling

It is well to mention a field of counseling which has been receiving increased attention of late. Mental adjustment problems arise because of age as such: a large proportion center around the idleness that goes with retirement from industrial or professional work. Just as a neurotic exploits an ailment or fabricates one in order to get attention, so an idle elderly person may resort to neurotic devices. Short of that he may be bored and unhappy. The obvious objective for the counselor is to help the oldster find some interesting things to do. For instance, a sour old man who owned stock in a canning industry was induced to go around and visit the orchards and plants. This changed his whole outlook. A study of the hobbies of people over seventy years of age indicated that 35 per cent had hobbies at the time, but 49 per cent formerly had them. Obviously some hobbies had been too expensive or too strenuous. It is highly desirable to get some good hobbies in advance of retirement. Some people feel that this is impossible because of physical limitations and hesitate further because of the erroneous assumption that you cannot teach an old dog new tricks. As a matter of fact persons beyond the age of sixty *have* learned to typewrite, to fly an airplane, or to speak French. It is helpful to counsel people who are approaching the retirement period with reference to avocational interests and pursuits, because retirement will add about eight hours to their day, and vacant leisure time is often a source of mental maladjustment.[19]

---

[18] Symonds, P. M., *The Psychology of Parent-Child Relationships,* Chapter 2. New York: Appleton-Century, 1939.

Prophylaxis

The discussion of psychotherapy is incomplete without some emphasis on prophylaxis. After all, it is better to prevent difficulties than to cure them once they have developed. With reference to the major mental disorders, one worth-while suggestion is to avoid the exciting causes for the psychoses. As noted earlier, most of these have a predisposing and an exciting cause. Even though a person has a predisposition, it may be possible to avoid the stimulus which will touch off the disorder. As to the predisposing aspect, in so far as it is heredity, something may be done through a eugenic program.

With the less serious disorders, the best prophylaxis is to avoid those barriers which cause the difficulty. For example, vocational guidance in the light of a person's aptitude may forestall his setting too high a level of aspiration and coming up against the barrier of inadequate aptitude for his work. Unfortunate parental attitudes that make for children's maladjustments may be minimized through a program of adult education for parents. Those who "precious" the child too much or complain that "he makes me nervous," may be shown the mental hygiene implications of this behavior. The home is, after all, a place of security, and if it falls short of this, maladjustment is apt to occur. The home is likewise the youngster's first psychology laboratory where he begins to understand about people and, if he finds maladjustments there, they are apt to be reflected in his own conduct. Occasional threats to security, like a new younger child in the family, can often be forestalled by letting the youngster help take care of the newcomer. Fear of the dark has sometimes been alleviated by showing the child how to turn the lights on and off. In other words, a lot of common sense things growing out of some of the previous discussion of causes of maladjustment could decrease those maladjustments by a little consideration of what certain environmental factors do to the individual. The school psychologist, the vocational counselor, and others who occasionally give advice to parents can promote quite a bit of prophylaxis along these lines.

Summary

Treatment of the major mental disorders is none too hopeful. Improvement has been reported in some cases as a result of shock therapy employing drugs or electricity. Cutting some of the nerve fibers in the frontal region of the brain (lobotomy) has helped some psychotics although it sometimes is fatal. Endocrine therapy for cases where the disorder is due to endocrine malfunctioning has obvious value.

---

[19] See Berrien, F. K., *Practical Psychology,* Chapter 5. New York: Macmillan, 1944.

It is in the field of mental hygiene with the less serious disorders that psychology makes its main contribution. It attempts to develop the whole personality in a well-integrated fashion. A frequent technique employed by the psychotherapist is suggestion—building up a particular salutary idea. Indirect suggestion usually is preferable to direct as it arouses less opposition. Auto-suggestion occasionally suffices, and in more extreme cases, it is advisable to resort to hypnosis in order to make the suggestion effective. Another technique is building up an idea the opposite of the one that is causing the difficulty. Emotional reconditioning may be successful in clearing up an emotional difficulty that was caused originally by a conditioning process. Sublimation is often an undesirable way out of a situation where the client is blocked, but sometimes a sublimation which gives a satisfactory emotional outlet is suggested by the counselor. Reasoning is feasible with clients who are capable of insight as to the cause of their difficulty. Environmental factors have some contribution to psychotherapy. A mere change of scene and getting away from the troublesome circumstances may suffice. Music appears helpful in some cases. Occupational therapy contributes to mental as well as physical aspects. The school makes definite contributions to mental adjustment through scientific placement or individual work with the pupils. The psychoanalyst discovers the suppressed complexes that cause the maladjustment, and the therapy consists mainly of talking about the details in such a way as to relieve the suppression, whereupon the symptoms clear up.

The interview itself serves as a therapeutic instrument. In fact, the diagnostic interview usually shades over into the therapeutic. Moreover, the different types of therapeutic interviews overlap, and the counselor may begin with one type and shift to another if the case warrants it. The directive, or advice, type of interview is counselor-centered, and its value depends on the counselor's skill in diagnosis and in deciding whether the client will respond to advice. In the cathartic type of interview the client talks himself out and thus gets emotional release. This type of interview has been quite successful in industrial situations.

The nondirective interview is client-centered, and the client does most of the talking. The counselor's attitude is very "permissive" and he frequently turns the client's own statements back to him as a means of getting him to elaborate the points still further. The counselor is careful not to give too much reassurance and not to make decisions for the client. Thus, the client is led to assume more responsibility for his problem and finally develops sufficient insight to take charge of things himself.

There often is a problem in terminating the interview for the client may want to go on and on, especially if there is some emotional transference to the counselor. It is well at the outset to indicate the probable time of termination. Another problem is the use of notes. The client may be worried if the counselor takes notes, but it may be explained that he merely wants to keep track of things from day to day and the counselor may make the notes in apparently casual fashion.

In group therapy, several persons talk over troubles which they have in common, under the guidance of the therapist. A member derives confidence from the discovery that his problems are not unique, and the discussion often leads to insight as to how to handle the difficulty, much as it does in the individual therapeutic interview.

Sometimes the therapy must be applied to parents or relatives rather than to the ostensible client. Unstable or overprotective parents cause problems. A counseling field that is beginning to receive more attention deals with old age. The increasing leisure of elderly people poses adjustment problems which may be helped by counseling on avocational interests.

Prophylaxis is always better than therapy. Some of the exciting causes for psychoses may be minimized. Eugenics can partially take care of the predisposing causes. Vocational guidance helps forestall some maladjustment due to the wrong level of vocational aspiration. Adult education for parents may eliminate some of the causes of frustration and tension in the home that cause maladjustment for the child.

12

PSYCHOLOGY OF TESTIMONY

THE DISCUSSION up to this point has dealt with psychology as applied to problems of education and medicine. We now turn to another professional field to which it makes some contribution—law and criminology. Even the truthful witness makes mistakes because of difficulties in perception or memory. The suspect who is trying to conceal the facts may be circumvented by scientific methods of crime detection. Finally, there are psychological problems regarding the criminal himself, the causation of crime, and the possibility of crime prevention. These aspects of legal and criminal psychology will be discussed in order.

At the outset, however, we shall scrutinize an apparent conflict in underlying philosophy between law and psychology.

The body of the law was built up empirically, and a great deal of weight is attached to precedent. If a lawyer wishes to secure a favorable ruling in a particular case, he searches through elaborately indexed records of other cases that are similar, hoping to find a ruling by some court which is in line with the one he would like to secure in the present instance. If no precedent is found, he may have difficulty in making his point. This tendency makes for conservatism in legal practice, whereas the scientist is all for experimentation. Legal conservatism is justified because the law deals with things which are basic to human welfare, whereas science can work with guinea pigs. The law is hesitant to try new things unless they are thoroughly established from a scientific standpoint. This is as it should be. However, when new scientific findings become thoroughly accepted by the scientists themselves, the law will admit them. When chemistry reached the point where it could adequately analyze blood clots on clothing, then such expert testimony came to be recognized. It is the same story with reference to psychological principles bearing on testimony. If some such principle is well established among the scientists themselves, and happens to be pertinent in legal cases, ultimately some court sees the point, admits that testimony, and a precedent is established. The conflict in legal and scientific points of view is more apparent than real and is largely a matter of tempo.

Errors in Perceiving the Original Event

General unreliability. The first point at which we may look for possible sources of error in testimony is in the original observation made by the witness. Something happens unexpectedly, an observer notes it with more or less attention, and subsequently is called upon to testify regarding it. A lot depends on how he saw it at the outset. It is easy to demonstrate the general unreliability of testimony under such circumstances. The classical demonstration was made at a legal convention. In the midst of a session several queerly dressed persons, evidently from a nearby carnival, dashed into the room, ran about, said a few things, shot off a revolver, and ran out again. Then the group was called upon to answer a series of questions about the event which had just transpired. The details of the event were actually known by the experimenters because it had been rehearsed. However, this group of jurists who were supposed to be experts in the field of testimony made astounding mistakes in reporting on such things as the costumes, the number of people, what they said, and the sequence of events. The same type of thing has been demonstrated time and again in college classrooms using a similar technique. The students describe a nonexistent necktie or hat, and report remarks which they think pertinent rather than ones which they actually heard. All this demonstrates in general the unreliability of observation for unexpected events.

Visual perception. One specific source of error is the actual refractive functioning of the ocular mechanism. The lens of the eye changes its curvature to focus the image of an external object on the retina. In some eyes, however, the depth of the eyeball compared to the curvature of the lens is such that the image does not focus clearly: in myopia or nearsightedness the image focuses in front of the retina so that the actual image on the retina is double. This difficulty can be offset somewhat by bringing the object closer to the eye, but even then there is a limit. Moreover, many of the objects about which the witness testifies are at a considerable distance where error due to nearsightedness is even greater. It is possible to wear spectacles which correct for the myopia, but in more severe cases, satisfactory correction is impossible, particularly for vision of distant objects. Thus, it is obvious that the testimony of a nearsighted witness for distant objects should be discounted. It is possible to suspect pronounced nearsightedness by noting the heavy lenses worn by the individual, but an accurate indication requires, of course, expert examination. There have been instances in which the lenses themselves played a part in the evidence. For example, a man crossing the street was hit by an automobile and brought action against the driver. A portion of the victim's spectacles was found on the fender and measurement revealed that he must have been extremely nearsighted in order to require such lenses—so nearsighted, in fact, that he should not have been at large without somebody to help him. Technically, this constituted negligence on his part, and he lost the case. Farsightedness is not so apt to be a source of error because the more distant the object, the more nearly it comes to focus on the retina. In this connection, too, it should be noted that perception of objects depends on their size, and there is a limit, for example, to the distance at which a person can be recognized. It may be 40 or 50 yards for a familiar person and good illumination, but if there is some distinctive aspect like a peculiar gait, the distance may be somewhat greater. The amount of illumination also determines ability to discriminate objects. In good moonlight, for instance, one has to be within something like 10 or 11 yards in order to be recognized, as compared with the daylight figures just cited.[1] Thus, in evaluating testimony, particularly that involving recognition, the conditions under which the object was observed must be considered.

Approximately 4 per cent of men are color blind to red and green and about 1 per cent of women. If color is important in testimony, it is well to check on colorblindness. Simple tests are available which are adequate at least for a preliminary investigation—one such test was mentioned earlier (page 193). The normal eye is color blind under some circumstances. In dim light all colors appear gray. This can be observed by watching a rug at twilight as the illumination is decreasing. The reds disappear earlier than the other portions of the spectrum. In so-called "twilight vision" red is not very effective as a stimulus, and the maximum brightness of the spectrum shifts from the yellow into the green region. Thus, one should be skeptical of testimony regarding a red dress seen by moonlight.

Visual efficiency likewise depends upon adaptation. The everyday instance is going into the movies on a sunny afternoon and stumbling over other people. However, after sitting there a while, one wonders why a newcomer is so clumsy. Thus, adaptation greatly increases visual acuity, so that it is in point to note the state of adaptation of a witness. Frequent discrepancies in testimony can be traced to this variable. A man entered a dark hallway, stumbled over some obstruction, and brought legal action against the owner of the place because of the obstruction. A witness who had been sitting inside the hallway for some time testified that the object was perfectly visible, and there was no excuse for the newcomer's falling over it. The discrepancy between their judgments could be attributed to the state of adaptation of the two parties.

---

[1] Gorphe, F., *La Critique du Témoignage*, page 338. Paris: Dalloz, 1927.

Space perception is often involved in testimony. A conventional experiment employs small dots close together and varies the distance between them until the subject can just barely ascertain that there are two. This gives the threshold for extension. The same thing is done for a single point which moves slightly while the subject attempts to discriminate the direction of motion. Similar thresholds for extension and motion can be measured in the periphery of the visual field. In direct vision the two thresholds are quite similar, but in the periphery the stationary dots must be separated, in some cases, by four times as great a distance as that required to make a moving dot perceptible. This means that for testimony involving discrimination of fine detail, if the stimuli are definitely in the periphery, more reliable results can be expected if the stimuli are moving.

Other space perceptions of legal significance deal with the third dimension, or depth, to which several factors contribute. For one thing, there are muscle sensations as the eyeballs converge or diverge, or as the lens itself changes its curvature according to the distance of the object fixated. Then there is retinal disparity—each eye gets a slightly different image of the object and the combined effect is translated into terms of depth. Finally, there are secondary factors like size, clearness, interposition of objects, and perspective, which give cues as to distance. It is to be noted that some of these criteria involve the functioning of both eyes—convergence and retinal disparity. Thus, if one eye is defective or not functioning at all, the witness will presumably be less reliable in reporting upon the distance of objects. This can be demonstrated easily by closing one eye and attempting to touch a designated point with the finger. One bit of corroborative evidence on this point was the finding of the California Department of Motor Vehicles that 20 per cent of the people involved in fatal motor accidents in San Francisco had acuity of 20–30 or less in one eye—that is, could perceive stimuli only at 20 feet as effectively as the normal eye could at 30 feet.[2]

Some of the common illusions may affect testimony regarding visual details. One of these is the tendency to overestimate vertical lines. If two lines of equal length are presented at right angles to each other, the naïve observer probably indicates that the vertical one is longer. This is partly because of the fact that two sets of muscles are involved in turning the eye up and down and only one set in turning it sidewise. This illusion has a bearing on testimony regarding the stature of a person, depending on whether the witness saw him prostrate or upright. Another common illusion is that whereby filled space seems larger. If a straight line is compared with another line of the same length with cross-hatching on it, the latter seems longer. As the eye sweeps along the line, it gets held up at each obstruction, and there is a greater total kinesthetic effort involved in moving along that line, so that it seems longer. This illusion might operate in the case of the witness judging the distance between objects on the street or in the yard according to whether the space is filled or empty.

---

[2] Quoted in De Silva, H. R., *One-Eyed Drivers.* Publication 274, National Society for the Prevention of Blindness, 1937.

Auditory space perception. Sometimes the witness is called upon to locate the direction of a sound. These localizations are made in terms of the difference in intensity at the two ears. Normally the sound is louder in the ear to which it is nearer. However, if the sound is in the median plane equidistant from both ears, it reaches the ears in the same intensity, and the normal criteria cannot operate. If his eyes are closed and a click is made below his chin, an observer may locate the source above his head. In some cases, particularly with low tones, differences in phase rather than intensity are the important factor and operate similarly. Thus, if a witness states that the sound was directly behind him and it is established that vision was eliminated and that the sound was momentary, there is considerable doubt about the testimony because the sound might just as well have been directly in front of him or directly above him. If the sound is prolonged, of course, he turns his head so as to get it louder in one ear than the other. Testimony may deal also with the distance of a sound. This usually is judged in terms of its absolute intensity, because as the source moves farther away, the sound becomes weaker. It is necessary, however, to insure that the witness was able to judge the nature of the sound, because a nearby mosquito and a distant locomotive whistle might sound quite similar. The nature of sounds is recognized by the timbre, or tone quality, which actually depends on the pattern of overtones. When any tone is presented, with the fundamental are certain secondary tones of higher pitch, and the particular pattern of these gives the sound its special quality. Therefore, it is important to establish whether the witness was sufficiently familiar with the kind of sound involved in order to be able to identify the nature of the source and judge its distance by the intensity. In some instances visual and auditory localization conflict. It is safer, in such a case, to trust the visual localization because there is a visual dominance under these circumstances. Experiments described elsewhere involved wearing spectacles which turned everything upside down and reversed right and left. The observer saw an object apparently in a certain direction and, if that object made a sound, heard the sound from a different direction. He located the source according to the visual rather than the auditory stimulus.

Tactual perception. On occasion, a witness has to describe something which he felt with his skin. One point to consider is the portion of the skin which actually was stimulated, because experiments reveal a differential sensitivity. The typical experiment explores the skin with two blunt points separated by a short distance to determine how close together they can be and still be discriminated as two points. This threshold is much lower—discrimination is much finer—on the more mobile parts of the skin like the fingertips, the lips, and the cheeks, and is much higher on regions like the upper arms, the legs, and the back. Thus, if a witness describes some tactual experience, more significance can be attached to the report if the more mobile portions of the body were involved. It should be noted, also, that tactual localization is sometimes difficult if the organs are in an abnormal position. There is the familiar trick of crossing the arms, placing the palms of the hands together with the little fingers up, interlacing the fingers, and rotating the hands downward into an awkward position. Then, if someone points to one of the fingers and the contortionist attempts to move that particular one, he frequently makes a mistake because it is difficult to judge these tactual sensations when the organs are in an abnormal position. Another instance is crossing the fingers and rubbing a pencil in the crotch thus formed. Under these circumstances, two pencils are felt. The implication of this is that if a witness's tactual organs were in an abnormal position, as in a rough and tumble fight, at the time of observation, his account should be discounted somewhat. This might occur in a scuffle in which several people were tangled up together and rolling about and it was a question of whether the witness was hit first on the leg or on the back of the neck. A few illusions in the tactual field may be mentioned. Perception of temperature depends somewhat on adaptation. When a person steps from the hot outdoors into a cool house, the coolness seems heightened at first. Tactual adaptation, too, is a factor. Grandmother hunting for spectacles that actually are on her forehead is a common instance. Then there are occasional illusory blends such as a cool, smooth object feeling wet. A witness may have touched a cool balustrade in the darkness and felt "blood" on it.

Perception of motion. There are several aspects of motion that may be of some significance for testimony. The witness may be in a moving conveyance such as a Pullman berth and later be asked to tell whether the car stopped before the bump or whether it was moving in the reverse direction. Perceptions of this sort depend on vestibular organs in the inner ear in which the liquid, by virtue of inertia or momentum, stimulates the nerve endings as the individual moves or stops. If he is moving forward, for example, the liquid lags behind and stimulates the end organs, and he has learned to interpret that sensation as movement in a forward direction. If, however, he slows down or stops, the liquid dashes ahead, stimulates the organs in the opposite direction, and gives the illusion, or after-effect, of moving backwards. The same principle operates with other organs in the ear for rotary motion. Thus, our passenger in the Pullman might testify that the train actually was moving backward, whereas it was merely slowing down and his vestibular sense organs gave him this illusion of reversed motion. If he could look out the window it would be a different story because the visual reversal effect is much less pronounced.

If the witness is stationary and the object about which he is testifying is moving, he is limited mainly to the visual stimuli. Transverse motion can be judged more accurately than motion toward or away from the observer because in the former case, there is a pronounced sweep of the image across different portions of the retina, whereas when the object is coming toward him, there are only slight changes in its apparent size, and in the retinal disparity and other criteria of depth perception. One is influenced, however, by such things as the noise made by the moving object and knowledge as to its possible maximum speed. This point was brought out in experiments where people stood beside the road when cars passed at different known speeds. They overestimated the speed of the noisy cars. It should be noted further that this type of perception is improved by practice. One is not born with any ability to judge miles per hour, but has to use the factors involved in perceiving space and motion and translate them into arbitrary terms. The testimony of someone who has had considerable experience in judging speed of vehicles thus should have greater reliability. It would be in point to ascertain such experience of the witness in order to determine his competence.

Another type of motion judgment is where both the witness and the object observed are moving. A typical case is a person riding in one car and judging the speed of another car. This type of judgment becomes very unreliable because of its complexity. Experiments have been conducted in which observers in one vehicle going at a constant rate watched an oncoming vehicle, likewise at a standard rate and, at a designated moment, judged at which one of several zones, marked by large numbers along the side of the road, the two vehicles would meet. The errors of judgment could then be analyzed. One of the principal findings was gross unreliability. The errors of a group of observers on one day were noted, and then the test was repeated on a subsequent day. The two sets of errors were correlated to see if, for example, it was possible to predict on the basis of the first day who would make the biggest errors on the second day. The correlation between the two days was on the average only -.14. In other words, this kind of judgment is very unreliable. Here again, much depends on the experience of the observer. If he has been riding a motorcycle behind automobiles and watching the speedometer, he probably has developed a much better facility in this type of observation.

Perception of time. There are trials in which the length of a time interval is crucial—for example, the interval between when the vehicle passed and when the shot was heard down the road, or the period between a warning cry and an explosion. The passage of time is judged to a considerable extent by slight kinesthetic sensations from the organism—little involuntary movements, or breathing, or heart-beats. The main point in the present connection, however, is that such estimates of time depend a good deal on what a person is doing in the interval. If he is busy, he is less aware of these kinesthetic items and less aware of time. This tendency is brought out in experiments where persons judge the lengths of intervals which are filled in different ways. In a typical experiment intervals of 24, 48, and 72 seconds were used. Sometimes the subjects sat passively; at other times the experimenter read to them from an interesting story; and in still other series they wrote longhand as he dictated at a rapid rate. The results are summarized in Table 13. Each subject spent a total of 144 seconds in each of the three ways. It is obvious that the average estimates were much greater for the idle period than for

TABLE 13

Time Estimation as Influenced by Filling of the Interval

	Average estimate in seconds	*Per cent of actual time*
Idle	214	149%
Listening to reading	189	131
Writing from dictation	162	113
Actual time	144	100

those in which the subjects were active. This experiment indicates the importance of ascertaining what the witness was doing during the particular time interval that is in question. If he was sitting on the fence idly swinging his heels during the interval between the passing of the car and the shot down the road, he would be inclined to report a longer time than if he were engaged in an interesting conversation. Moreover, there are marked individual differences in judgment of time intervals, quite apart from the filling. For 200 subjects judging an interval of thirty seconds, estimates ranged all the way from seven seconds to four and one half minutes. It is possible, therefore, that a witness is of a type that grossly overestimates or underestimates, and it is desirable to investigate his individual reliability in this respect. It is unwise, however, to test his time estimation in court by clicking off an interval and letting the witness judge it. There is danger of his getting secondary cues or noting a watch that the other people do not see, and furthermore, suggestion and expectation introduce much greater errors here than under laboratory conditions. Much depends too on experience, and it is in point to ascertain if the witness has had any experience in judging time. If, for example, he boiled eggs in a lunch room, he may have a better notion of intervals of a few minutes than does the ordinary individual.

Psychophysical law. A principle which applies to various types of perception is the relation between the intensity of the stimulus and the intensity of the resulting sensation. Stars are invisible in the daytime, although a star is adding the same amount of absolute intensity to the surrounding sky, day or night. However, in the daytime the increment is a very small percentage of what is already there so it is not perceptible. The basic law is that for a sensation to become perceptibly more intense it must be increased by a certain proportion rather than by a certain absolute amount. A sound must be about one third louder physically in order for it to be perceptibly louder, and a light must be about 1 per cent brighter in order to be perceptibly brighter. In other words, the intensity of an experience depends upon the background against which it is perceived. This would have a bearing upon the testimony of a witness regarding the visibility of headlights on a brightly lighted street as contrasted with those on a country road or headlights in twilight when there was still considerable daylight present. It would also explain differences in audibility of conversation overheard in the subway or on a quiet bench out in the park.

Stimuli to involuntary attention. Perception is influenced by the attention devoted to an object. Attention is largely a matter of assuming a posture or making adjustments so as to get more of the object. One turns the head, focuses the eyes, and even holds the breath in order to avoid distraction while observing and listening. As more attention is devoted to one thing, less attention is available for other things. A common notation deals with focus and margin of attention. Things in the focus are clear and things in the margin are less clear. When some new thing comes into the focus, it tends to crowd out what was there previously. The everyday instance is the legerdemain performer, who moves the left hand vigorously on some pretext while disposing of a palmed object with the right hand. It is important to examine the field of attention of the witness at the time the observation was made. If it can be shown that he was attending to some things, there is a presumption that he would less readily see certain other things. One way of determining how his attention may have been directed is to note the kinds of stimuli that normally do get involuntary attention. One such characteristic is the intensity of the stimulus. Loud sounds and bright lights cannot be ignored. A crash of vehicles would have high stimulus value although it would not insure that the witness saw what preceded the crash. Novelty is another factor. A witness sees a strange person coming from the house or garage and observes him more closely than a familiar person. Motion is an effective stimulus for attention, even motion in the periphery of the eye. Vehicles are readily observed for this reason. Large objects claim a good deal of attention. Contrast—for instance a large person beside a small one—has good attention value. Then there is the matter of interest. A person normally pays better attention to things which interest him; if he is interested in airplanes he would try to identify one which flew over. One common source of interest is vocations. Usually, a person is more interested in things pertaining to his vocation. It might be well to ascertain if the vocation of the witness was at all related to the details about which he is testifying. A carpenter, for example, would be a good witness regarding the condition of some staging because he normally is set for that type of thing. By the same token, a motor mechanic might notice a knocking engine and thus have his attention directed to a passing car.

Range of attention. Another characteristic of attention that is of legal significance is its range, that is, the number of simultaneous impressions that can be grasped. Experiments with short-exposure apparatus reveal that the range is limited. If four or five digits are flashed on a screen for a tenth of a second, most people can read them, whereas many persons have difficulty with six or seven digits, and almost everyone fails with eight or nine. In other words, approximately six discrete impressions is about all that one can take in at a single glance, although intensive training may increase the range. Few people have had such specific training. This principle has a bearing on situations where the witness observed something for only a brief interval. If a raiding squad breaks into a room and the lights are switched off immediately, a squad member testifying about twelve different people in the room undoubtedly is drawing on his imagination because one cannot take in twelve things in a single act of attention. A conductor of a railroad train was testifying about the behavior of a certain individual after the wreck—whether he was sitting down or walking around. On cross-examination the conductor told about a great variety of things that occurred at that same time. It became evident that what he was telling was just too much for the ordinary range of attention, and his testimony regarding the crucial individual was discounted somewhat.

Accommodation of attention. One characteristic of attention relates primarily to the adjustment before the event is observed. Such initial adjustment renders the attention more effective. The sprinter is given a brief verbal warning a few seconds before the pistol is fired and thus makes a quicker getaway. In reaction-time experiments in the laboratory a preliminary warning is given before the stimulus to which the subject is to react. If the attention is thus "accommodated" in advance, the subject gets a better impression and the stimulus breaks in upon him more quickly, as it were. If someone yells, "Look out!" a bystander will look in the direction indicated and observe things more accurately than he would otherwise. If somebody says, "Watch that man," or "Why doesn't the train whistle?" or calls attention to the speed of a car, a witness will be able to give a better account of what he saw than he would without that initial adjustment. So it is well to consider any initial cues which may have accommodated the witness's attention for the event prior to its occurrence.

Memory for Details of Crime

Importance in testimony. We have noted some possible sources of error in the original observation by the witness. It is now well to consider other sources of difficulty that develop in the interval between the event and the testimony. It is known, in a general way, how memory for details decreases with lapse of time. There is a possibility that some of the details which the witness may have observed correctly enough at the outset will slip away from him before the case gets into court.

Frequency. It will be in point to review a few of the principles of memory which determine its effectiveness or ineffectiveness and which might have a bearing on the witness's memory. One principle is the frequency of observation. If a thing is experienced many times, it is remembered better than if it is encountered only once. A person who saw the same suspect go into a certain door repeatedly will presumably remember it better than a person who saw that event only once.

Recency and primacy. Another significant factor is the time between the event and the trial, that is, whether the testimony deals with something recent or more remote. The trend of the forgetting process has been noted elsewhere: it proceeds quite rapidly at the outset and then less rapidly later on. Under certain laboratory conditions as much is forgotten in the first half-hour as in the next week, particularly when material has not been very thoroughly learned. Much of the material involved in testimony has been observed only once and so has not been very thoroughly learned. The implication of this principle is that everything possible should be done to get the testimony early before the details have been forgotten. It has been proposed that immediately after an event such as an accident, witnesses be taken to headquarters, sworn in, their testimony taken at that point, and a transcript of that testimony be admitted later in the trial. The difficulty from the legal standpoint is that the witnesses were not subject to cross-examination when giving their evidence. Primacy is of less significance than recency in the present connection, but the initial experience of a given sort does make quite an impression. For example, the witness's first customer or first client may have made a vivid impression which will persist.

Emotional factors. Many of the situations involved in testimony involve emotional components, and it is well to note the effect of emotional factors on memory. Usually a mildly affective experience—one which is pleasant or unpleasant—is better remembered than experiences which have no tone of that sort. In typical experiments where persons recalled words which had been read to them and later graded those words as to whether they were pleasant, unpleasant, or indifferent, it was found that they recalled about 21 per cent of the pleasant ones, 18 per cent of the unpleasant and 14 per cent of the indifferent. On the other hand, with more pronounced emotional disturbances such as fear and rage the effect on memory is quite the reverse. Emotion is a disorganizing experience, and this disorganization tends to operate against effective recall. A pertinent experiment introduced an unexpected event during a college class discussion. Subsequently, a check was made on memory for the material which was under discussion in class and memory for the details of the unexpected event which was emotional in character. The greater magnitude of the errors on the emotional material as contrasted with the unemotional was of the order of 16 to 20 per cent, depending on how long a lapse occurred before recall in the different parts of the experiment.[3] Actual court room instances where errors in memory were introduced by virtue of the emotional factor are not difficult to find. An excited bystander testified that a truck deliberately ran down a woman. Somebody who saw an accident in which a few people were hurt and there was a little blood flowing testified about a large number of people who were injured.

In this connection it may be of interest to note a peculiar legal practice of admitting spontaneous exclamations made at a time of stress, on the general ground that the witness is too excited to fabricate a false explanation. At the time of an accident, one bystander says, "He didn't blow his horn," which is admitted later as a good bit of testimony because the bystander was too excited to make up that story. This is acceptable from the fabrication standpoint, but on the other hand, the excitement militates against accurate observation, and the remark itself might have been erroneous.

Constellation. Most memory is of the serial type where a first item is associated with a second, the second with a third, and so on, and they can be recalled only in that order. In the constellation type, however, the items are all interconnected so that any one of them is liable to bring back any one of the others. This is the principle involved in taking the witness back to the scene of the crime in the effort to get at some forgotten detail. Suppose that the witness did not remember the last words that were said before the shot was fired. In the actual crime situation there was a red cushion, a green chair, a radio in the corner, a canary bird, and the crucial remark, "You don't dare to." All these items were associated together in a constellation so that any one might call up any of the others. In court when counsel merely asked the individual what was said, that stimulus was not sufficient to arouse his memory. However, if the witness went back to all the original things, such as the cushion and the chair, these items might converge upon the last words and he would be able to recall them. The same principle is also employed in "refreshing recollection," where the witness may be allowed to use a memorandum or a telegram that was involved at the time of the original event, not as actual evidence but merely to facilitate recollection. What actually is happening is that the memorandum or telegram is part of the constellation and helps converge upon the forgotten detail. In the serial association, as indicated above, the items must be recalled in the same order in which they were experienced, and any deviation from that order causes difficulty. This principle sometimes is capitalized on in cross-examination of a witness who is presumed to be fabricating a story. He is allowed to tell his story and probably relates the items in a sequence which he has memorized and rehearsed. Then, on cross-examination, if counsel breaks into the middle of the sequence or even goes backwards, the witness has trouble. If the items are memorized in the order *A, B, C, D,* it is difficult to proceed from *C* to *A.*

---

[3] Jaffa, S., "Ein Psychologische Experiment im Kriminal Seminar der Universität Berlin," *Beiträge zur Psychologie der Aussage,* 1913, 1, 79–100.

Retroactive inhibition. Mention was made elsewhere of the way that memory is influenced by what happens immediately after the event in question. An accident may produce retroactive inhibition for events just preceding it. Testimony on such events should be regarded with caution, especially if the witness was knocked unconscious. There are everyday instances in which a person is knocked out and subsequently thinks the accident was on a Tuesday rather than Wednesday. An engineer was pulled out from under a wreck and immediately mentioned that the water gauge was about half-full. There would be some doubt as to his recalling an observation made just prior to the profound shock. There was a burglary of a financial institution in California in which the watchman claimed that several men had entered and overpowered him. He gave a very detailed account of everything that had happened right up to the moment when he was hit over the head with a black-jack—so good an account, in fact, that somebody who knew about this principle of retroactive inhibition was skeptical. This led to further investigation, and it developed that he had stolen the money himself.

Intention. If a person learns or observes something with the intent to remember, it will be recalled better than if he had no such intent. Memorizing a list of words with the idea of remembering it a long while actually makes it persist longer. A person may have difficulty in recalling whether the familiar doorknob is on the right or the left, because he has not operated it with any thought of its location, or recalling it. Similarly, one cannot tell which shoe is put on first in the morning. Thus, a detective who goes out to watch somebody with the specific idea of noting certain reactions, undoubtedly gives a better account of events than does a casual bystander. Things which are done as a part of a regular routine are not as likely to be recalled as things which are a bit out of the ordinary. A secretary who witnesses an employer's signature on numerous occasions will not remember a particular one, but a janitor who is brought in for this one purpose will doubtless remember it and he probably will tell his family about it for good measure. A man murdered his wife, dragged the body into the yard, left a poker nearby, and unbolted the gate so as to make it appear that someone had come in from outside. One of the servants found the body in the morning, rushed out the gate to tell the police, and later testified that the gate was bolted. She made this misstatement because she was in the habit of unbolting the gate every morning. This tended to direct suspicion inside the house, and the husband was convicted.

Supplementing with imagination. When memory is difficult, it all too frequently is supplemented with imaginary material. Subjectively, memory and imagination are very similar. It is difficult to discriminate introspectively between memory of a particular apple and an imaginary apple. If the witness finds some details missing, he tends to fill in the gaps. He does not remember just what color the dress was but thinks that maybe it was red and tends to recall it as such. He believes he locked the door when he merely intended to and confuses the idea of locking it with the actual event. This supplementing is often influenced by bias and a person recalls what he wants to recall. It is notorious in testimony that the other driver is always at fault. That is one reason why it is common practice to discount the testimony of relatives because, even though they may be sincere, if they are supplementing gaps in their memory, they are inclined to do so in line with their sympathies.

Recognition. The witness is often called upon to identify or recognize something rather than to recall it outright. False recognition is a very frequent phenomenon. It depends primarily on the fact that there are certain elements in common between the original object and the one which is incorrectly recognized as the original. If one object comprises items *ABCD* and the other *CDXY,* the *CD* portion is enough to mislead the witness. Everyone has slapped the wrong person on the back, because of similar elements in the total configuration. Numerous instances of incorrect recognition in the legal field have been reported.[4] For example, in one city there had been a series of forged checks. Finally, a man paid his bill by check to one of the large stores and then closed out his account. He was suspected for this reason, other people also identified him, and he was brought to trial. Seventeen witnesses identified him as the man who had cashed bad checks in their establishments. He was sent to the penitentiary, but the checks still appeared and another person who actually was guilty was apprehended. Again, a suspicious character shot one of two policemen who accosted him in an alley at night. When a suspect was under consideration, he was dressed up by the police in a sheepskin coat and a toboggan hat similar to the description provided by the surviving officer. The latter was then called upon to recognize the suspect by a flashlight such as had been used on the original occasion. This procedure might be all right if the suspect wore his own clothes which were similar to those observed at the time of the murder. But deliberately dressing him to resemble the description was flying in the face of science, and it is small wonder that an incorrect recognition was made.

---

[4] *Cf.* Borchard, Edwin W., *Convicting the Innocent.* New Haven: Yale University Press, 1932.

Another factor that should be considered is the probability of making a mistake in recognition just by statistical accident. All too frequently the suspect is brought in and the witnesses are required to say, "Yes," or "No." With their eyes shut they would make the correct decision about half the time, and there is always the danger that with the eyes open they will practically guess and half the time convict an innocent person. This difficulty can be minimized by lining up several persons and making the witness select from these alternatives. If there are five people, the probability of selecting an innocent person by accident is only one chance in five. If the witness selects the sheriff from the line-up rather than a suspect, it is obvious that he is making a mistake.

Incorrect recognition in the auditory field is also a problem. There are instances in which the witness did not see the other party at all but talked to him in the dark or over the telephone. There is a famous case of the ransom money handed over in the cemetery at night, and the subsequent question of recognizing the recipient's voice. An experiment on auditory recognition is pertinent in this connection. A man read a short paragraph of fifty-six words from behind a screen while other persons listened. Later, they were called upon to identify this man by selecting him from five persons who read a similar passage. The per cent of correct recognition varied from 83 per cent a day later to 51 per cent in three weeks and 15 per cent after five months. Obviously, memory for this kind of thing dropped off appreciably with the lapse of time. The situation was somewhat worse if several read the passage originally and only one of them was included with the alternatives from which selection was made. After a two-day interval the per cent of recognition with the single voice was 83, with three initial voices, 94, with four voices, 52 per cent, and five voices, 46 per cent.[5]

Suggestion

Unintentional use by examiner. An insidious source of error in testimony is suggestion, whether it is applied deliberately or unintentionally. If a witness gets an idea that some particular thing happened, regardless of where the idea came from, it may operate as a suggestion and lead him to testify accordingly. This is very apt to occur when people are examined in a preliminary way before any actual court action. The police and others question persons who might know something about the event, and very frequently the questioners inject their own theories into the testimony unintentionally. If an officer is questioning a child, he is inclined to look for the things which might corroborate his own theory and he may even use leading questions. This whole difficulty is quite understandable. Law enforcement people are under pressure to get results if they wish to remain secure in their own position. If some crime receives a lot of publicity but is not solved, the public begins to think that it needs a change in the law enforcement organization. Therefore, officials make a strenuous effort to produce results, and the most obvious way to do this is to get the right theory as to what happened and then find evidence to corroborate it. Thus, they may plant ideas and emphasize certain points which the witness hesitates to admit but finally does as a result of suggestion. This does not mean that the official is deliberately attempting to secure false evidence but merely that he is a victim of his own enthusiasm.

---

[5] McGehee, F., "Reliability of Identification of the Human Voice," *Journal of General Psychology,* 1937, 17, 249–271.

Children's testimony. Suggestion is especially apt to play a role in the testimony of children because they are more suggestible than adults. In simple tests where a picture is shown and tricky questions are asked about it, seven-year-old children accept about 50 per cent of the suggestions, whereas eighteen-year-olds accept only 20 per cent of the same suggestions. It is possible to go into one of the lower school grades with a bottle of distilled water, tell the pupils that you want to see who has the keenest smell and that after the stopper is removed they are to raise a hand as soon as they smell anything. In a few moments most of the hands in the room will be up. On one such occasion, a little girl became sick from the odor of the distilled water.

Another demonstration of this same trait was an experiment involving 300 high-school pupils, 300 college students, and 300 adults. They all answered 75 questions dealing with public problems, for example, the desirability or undesirability of advertising tobacco on the radio. Then, each group was divided into three, and they all filled out the questionnaire a second time. For one third the alternatives on the blank were marked in green in the way the majority had marked them. For another third the answers were marked in red according to the way a group of "experts" had decided they should be answered. The last group took the test a second time without any suggestions.[6] The results are summarized in Table 14. It gives the percentage of the opinions that were changed on the second test. In the control group the figures represent a random change of opinion. In the other two groups the additional increment of change was due to the suggestion of majority or expert opinion. The point of interest in the present connection is that 64 per cent of the high-school group changed as the result of majority suggestion, whereas only 40 per cent of the adults changed. With the expert opinion, the corresponding figures were 51 and 34. Obviously the younger people were more suggestible.

---

[6] Marple, C. H., "Comparative Susceptibility of Three Age Levels to Suggestion," *Journal of Social Psychology,* 1933, 4, 176-184.

TABLE 14

Percentage Change of Opinion as a Result of Suggestion of Majority or Expert Opinions *

	High School	*College*	*Adult*
Control	17	16	14
Majority	64	55	40
Expert	51	45	34

* Marple

In the light of these facts, serious miscarriage of justice may be anticipated in cases where children are relied upon for evidence. In a European town a small girl disappeared from home, and later her body was found in a ditch. She had been playing with two other little girls the preceding afternoon. These playmates were pulled out of bed at 3 A.M. and questioned by the police, and before it was over, they agreed that a tall man with a beard had enticed their friend away. Someone eventually was found who matched the description, and this testimony played quite a role in the early stages of the trial, although justice ultimately prevailed. In a small town in Alabama, George visited Louise frequently and was very jealous of her. There was a fourteen-year-old niece named Topsy who lived at the house with Louise, and once when George came there in Louise's absence he gave Topsy fifty cents. Shortly thereafter Topsy disappeared. The sheriff questioned two girls aged twelve and nine, and eventually they described how George and Louise had killed Topsy with an axe and carried the body in a sack to the river. Louise herself confessed and then repudiated the confession. After the trial was well under way, Topsy appeared from the home of some relatives where she had been visiting. Presumably, the sheriff was anxious to solve the case, had his own theory as to why the older people might wish to be rid of Topsy, and by the unintentional use of suggestion, obtained an admission to that effect from the children.[7]

There are occasions in which the suggestibility of children has been capitalized on by deliberately planting suggestions. A parent may tell a child what happened, thus suggesting the way the latter should testify when questioned. A lawyer with questionable ethics fixed a child's testimony by suggestion in the following fashion. It was in a case of assault and battery, and a question of who hit the first blow. The only crucial witness was a child who had seen the fight between his father and another man. The lawyer wished to establish the fact that the father had started it. He managed to get hold of the youngster a few minutes before the trial and explained to him that the other lawyer was very "slick" and would make him say that black was white; "And of course you know that your father hit him first, but this other lawyer will try to make you say it the other way. So be careful." The suggestion was sufficiently effective so that the youngster did testify against his father, regardless of the actual facts.

---

[7] Borchard, Edwin W., *Convicting the Innocent,* page 39. New Haven: Yale University Press, 1932.

Low intelligence. Just as youngsters are suggestible so are adults with low intelligence. With a group of children aged nine to ten, a test of suggestibility was correlated with the National Intelligence Test. The suggestibility test involved was one in which a series of questions were asked with obvious answers, and so arranged that alternate answers were yes and no. Then the questions became more difficult and the yes-no answers did not alternate. Suggestible persons had already received this set and continued to answer alternately yes and no for a time. The extent to which they persisted in this trend constituted the measure of suggestibility. The actual correlation between suggestibility and intelligence in this case was -.55.[8] Another study showed a closer relation of suggestibility to mental age than to chronological age. Hence, one should be on guard against suggestion in the case of witnesses who are low in intelligence as well as in the case of children. Barring actual intelligence tests, such people may be found in a group that dropped out of school early or that are engaged in unskilled laboring types of work (page 197).

Form of questions. The tendency of a person to accept a suggestion depends somewhat on the form in which it is presented to him. In legal situations evidence usually is brought out by examination so that the form of question is important. A leading question such as, "This is the man you saw down there, isn't it?" is, of course, heavily loaded with suggestion. Or the presence of something is implied, and a question asked about it, for example, "Was the dog black or white?" when there actually was no dog at all. If such a question is asked in court, the opposing counsel will object, and usually the objection will be sustained—at least in a direct examination. In cross-examination some leading questions may be permitted in an effort to check on the accuracy of the direct examination on the theory that if the witness is sure of his ground, he will see the trap and will not fall into it. Aside from actually leading questions there are some subtle factors in the wording of the question. Experiments were made with a short moving picture followed by questions about the items phrased in different fashion. For example, some subjects were asked, "*Did you see* a sailor in the picture?" and others were asked, "*Was there* a sailor in the picture?" in order to check on the subjective *versus* the objective form. Another variable was a negative *versus* a positive formulation. There were upwards of 4,000 responses to questions in each form. Somewhat more suggestion—saying "Yes" when that answer was actually incorrect—occurred for the objective than for the subjective form. The per cent error was 19.1 and 17.6 respectively. The critical ratio—the difference divided by its standard deviation—was around 2 which is none too encouraging, but indicates that the results were not entirely due to accident. In several comparisons between negative and positive formulation of the questions, the former carried a little more suggestion, although the difference was a bit less than in the case of objective *versus* subjective.

---

[8] Young, P. C., "Intelligence and Suggestibility in Whites and Negroes," *Journal of Comparative Psychology,* 1929, 9, 339-355.

Suggestion from other sources. If a witness knows how others testify, that information may operate as a suggestion. When a number of people are called in to identify someone, they sometimes are all brought into the room simultaneously. After No. 1 identifies the suspect, it is natural for Nos. 2 and 3 to follow suit, whereas if they had been doing it alone, they might have reported otherwise. Sometimes suggestion spreads from one person to others and from each of these to still others in expanding fashion. This may reach epidemic proportions. There was an instance in Paris involving a presumed sadist who was going around in crowds and stabbing people slightly. After due publicity—suggestion—large numbers of persons felt themselves being stabbed. The thing came to a head, finally, when some woman in a streetcar accused a high police official whom she did not recognize, of having stabbed her. In an Illinois town, in 1944, there was quite a bit of excitement about a "mad anaesthetist," who sprayed in bedroom windows some poisonous substance which paralyzed people. Quite a number of victims smelled the odor and were ill enough to remain in bed for a time. The affair was finally traced to fumes of carbon tetrachloride from a nearby factory that might have suggested the gaseous anaesthetic. Another instance of extraneous suggestion is the fact that in automobile damage suits it is not permissible to ask the defendant if he carries automobile insurance. The obvious reason is that the jury might be inclined to sock the insurance company. However, counsel will often ask the defendant if he has any stock in an insurance company, thus planting the idea of insurance without having it ruled out. Incidentally, even though a suggestive question is ruled out, the damage may be done. After all, suggestion is merely a matter of putting an idea vividly before a person, and the mere fact that the witness is not allowed to answer a particular question does not prevent him from thinking about the content of the question.

Hypnotism and testimony. On the subject of suggestion, it is well to scrutinize the possibilities of the more profound state of suggestibility which is found in hypnosis. The therapeutic use of this mechanism was discussed earlier. It has been proposed that the witness be hypnotized and the suggestion given that he tell the truth while he is questioned. This is all right in the sense that the witness would, under those circumstances, make an effort to give the true facts. However, it should be noted that he is unduly suggestible to anything while he is under hypnosis. The dangers inherent in the form of the question, as discussed above, would be raised to the Nth degree under these conditions. Even the manner of the examiner might have undue influence. Therefore, there would be too much chance that the examiner's own ideas would get into the testimony, even though the witness was instructed to tell the truth. There is the further danger of collusion. After all, it is difficult to tell whether a person really is hypnotized, particularly the first time. It might be possible for a fraudulent person to pretend to be hypnotized and then lie to his heart's content while the examiner thought he was telling the truth.

It is somewhat the same story for the use of drugs. The so-called "truth serum," scopolamin, has been used occasionally, and some claims made as to its success. Apparently, what it does is render a person more talkative but it does not insure that when he says will be true. Neither does it insure the absence of suggestion in his replies to questions. Other drugs have been used to make people talkative. For example, sodium pentothal has been used in exploring the background of psychoneurotic cases (page 276). Nothing has been published so far about its use in crime detection work. It is probable that the difficulties will be about the same as with scopolamin.

Hypnosis and crime. One other aspect of hypnosis should be mentioned: the possibility that a person may be given a hypnotic or a posthypnotic suggestion to do something of criminal character. Experimentally, persons have thus been induced to stab others with paper daggers and shoot them with blank cartridges, although the subject actually knew that the dagger was paper and that the cartridge was blank. It seems that in this state there is a dim realization of the artificiality of the situation. A hypnotized person is told that some other person who is actually in the room does not exist. He does not react to remarks by that person, but if he is crossing the room and the other person is in the way, he goes around him rather than crash into him. Hence, it is probable that for any major crime, a realization of the whole situation would be present to a sufficient degree to forestall the offense. It might, however, be possible to suggest an hallucination which would lead to crime—for example, to suggest that the neighbors' dog was a fox so that the subject would shoot the fox. In one instance a subject was given the posthypnotic suggestion that the instructor's overcoat was his own and that he take a dollar bill out of the pocket before he left. This suggestion actually was effective.[9]

There is also the possibility of a crime being committed against a hypnotized person and amnesia suggested so that he or she will not recall the crime. This has actually occurred with sex offenses, but there have also been cases where a person who had been hypnotized made false accusations of this sort. The moral of this is that people should not dabble in hypnosis except for therapeutic purposes or for scientific investigations where other techniques are unable to produce the desired conditions.

Psychological Problems in the Course of the Trial

Method of getting testimony. There are three methods by which testimony is obtained: a free recital, a direct examination, and a cross-examination. It is of interest to compare these methods experimentally as to the completeness and accuracy of the resulting testimony. One such experiment involved a brief incident which transpired in the midst of a college class.[10] A person dressed in western costume entered with a few books under his arm, and delivered a message to the teacher who read it, made some notations, and handed it back. While the messenger was waiting, he rubbed a large knife on his gloved hand in apparent embarrassment. There were numerous other details which might be of evidential value, but nothing dramatic. About 150 questions were based on this brief scenario. Some were used in direct examination, some in cross examination, and some in free recital. The results are shown in Table 15. Completeness means the proportion of the total number of items that were correctly reported. Accuracy indicates the per cent of those actually given that were correct. Caution is the ratio of "Don't know" answers to the total of "Don't know" and wrong answers. The table indicates that free recital is the least complete but the most accurate as far as it goes—94 per cent. The direct examination is appreciably more complete but not as accurate as the free recital. The cross-examination has about the same completeness as the direct, but is somewhat less accurate, which might not be so serious, because part of the function of the cross-examination is to check up on inconsistencies in the direct examination. Both direct and cross-examination showed considerable caution—the latter a little more, as might be expected. The experiment was repeated when the subjects knew, or at least suspected, that they were to be questioned about the event, but the results were not essentially different from those just mentioned.

---

[9] Wells, W. R., "Experiments in the Hypnotic Production of Crime," *Journal of Psychology,* 1941, 11, 63–102.

[10] Marston, W. M., "Studies in Testimony," *Journal of Criminal Law and Criminology,* 1924, 15, 5–31.

TABLE 15

Method of Obtaining Testimony *

	Free recital	*Direct examination*	*Cross-examination*
Completeness	23	31	29
Accuracy	94	83	76
Caution		40	52

* Marston

Some other points are brought out in this same experiment. The testimony was taken down by a stenographer and subsequently the typed testimony was submitted to various persons, including a number of legal experts. These persons went over the written testimony and tried to determine the actual facts on each of the 150 points. The experts came nearer to the actual facts than did a jury of a dozen persons who went over the material. This suggests the possibility of such a thing as a testimonial expert who might be retained as a friend-of-the-court. It is conceivable that a defendant might wish to put his case in the hands of this expert who could be given considerable authority in making decisions.

The oath. It is conventional practice to put the witness under oath, partly on the assumption that this will insure his veracity. Actually, there are marked individual differences in this respect. A few people are afraid to lie under oath because of the religious feature. Others give this aspect no consideration whatever. A good deal depends on how much is at stake. A person who is lying in order to save himself from the electric chair is not too concerned about the oath which he has taken, although in one famous murder trial, the judge naïvely cautioned the defendant, "Remember, sir, that you are under oath." The oath has a technical function in that if a person makes a false statement he can be charged with perjury. Its psychological effect is variable and cannot be predicted in the individual case. Certainly it is no panacea for mendacity.

Order of presentation. It might be suspected that the opinion of a jury would vary in the course of a trial and that there would be, for instance, some advantage in having the last word. This suspicion was corroborated in the following experiment.[11] The evidence in a famous bigamy case was read to a group of listeners, and, after each installment, they gave a rating as to guilt or innocence. A rating of 1 meant that they were certain of the defendant's innocence and 9 meant that they were certain of his guilt with the other ratings intermediate. The results can best be shown graphically. The vertical dimension in Figure 9 represents the judgments of guilt. The heavy central line gives the median judgment of the jurors. The higher this curve, the more guilty the average jurist considered the defendant at that particular moment. The horizontal axis represents the temporal course of the trial. The two lighter curves represent the 25 and 75 percentile judgments so that the shaded area includes the opinions of the middle 50 per cent of the jurors. The stippled regions indicate the time during which material was pre-

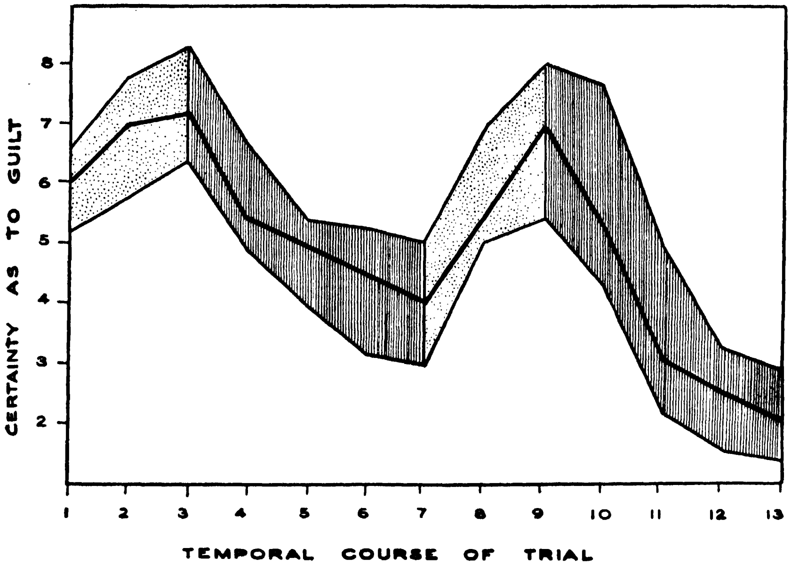


Figure 9. Change of Opinion as to Guilt or Innocence in the Course of a Trial.*

---

[11] Weld, H. P. and Roff, M., "A Study in the Formation of Opinion Based upon Legal Evidence," *American Journal of Psychology,* 1938, 51, 609–628.

* Weld and Roff.

sented by the prosecution and the cross-hatched regions involve the defense. The trend is obvious in the curves. At the outset, the subjects felt quite strongly that the defendant was guilty and after the prosecution felt so still more. As the defense progressed, they were less convinced of guilt. After the next prosecution the curve went up again and finally dropped after the last defense. The next obvious experimental procedure was to change the order of presentation to see what would happen. In the first series just described, the judgment at the end of the evidence was 2.0 which is definitely in favor of innocence. The second series used the same material but presented all the defense material first, followed by all the prosecution material. The judgment at the end of this series was 4.4 as contrasted with the 2.0 just mentioned. The next series gave all the prosecution first followed by all the defense, and the end result was 2.0 again. This experiment shows the effect of recency on judgments of this sort, and presenting the materials in the conventional order seems to be giving the defendant a break, which is, perhaps, as it should be. There were marked individual differences in the jurors participating in the experiment. Some had an attitude of doubt at the outset and maintained it as long as possible. Others were very easily swayed by new evidence. Some were unduly cautious and balanced each bit of evidence against the others. Some showed a tendency for their initial judgments to affect their later ones. Another similar experiment involved a mock trial and periodic ratings on a nine-point scale. Trends somewhat like the foregoing were discovered, but of special interest was the fact that about 25 per cent of the jurors formed an opinion early and did not change it.[12] This is not very comforting to those who regard the modern jury as a most efficient institution. The juries in this experiment were, moreover, probably of higher type intellectually than many of the juries that operate in actual practice.

Psychological Problems of the Jury

Personnel. There are some psychological considerations in connecnection with the personnel of the jury. One of these is the extent to which they actually devote their attention to the matter in hand. Some of them are often preoccupied with other things. If business people, for example, are drawn for the jury, they worry about what is happening while they are away from the office, which preoccupation results in inadequate attention to the business of the trial. Another personnel consideration is the juror's occupation as related to things that transpire in the trial. There sometimes is an occupational bias as, for example, the bias of property owners on the jury when the trial involves a landlord *versus* a tenant. There is considerable tendency for jurors to side with the underdog. Then, there is the question of the intelligence of the jurors. Sometimes quite technical matters are under consideration, and one sometimes wonders if these ordinary people, some from the lower walks of life, are intellectually competent to grasp these problems. Many of the better equipped people intellectually who would really make the best jurors from this standpoint, are able to sidestep that obligation. The result is that the intellectual caliber of the average jury is lower than is desirable in the interest of justice. Jurors are screened to some extent on the basis of preconceived notions about the case and on the basis of a minimum of education, and it would not be at all amiss to screen them further by means of intelligence tests.

---

[12] Weld, H. P. and Danzig, E. R., "A Study of the Way in Which a Verdict is Reached by a Jury," *American Journal of Psychology,* 1940, 63, 518–536.

The effect of discussion. It is well to examine the jury situation experimentally to note the effect of discussion of the evidence. One experiment involved an incident in a college class in which someone entered, tipped over some apparatus, and so forth. Two members of the class, one from the front and one from the rear of the room, gave a free narration of what had occurred before seven jurors. These jurors wrote out individually a detailed account of the event, then the jurors discussed it and came out with the final story on which they all agreed.[13] The results are summarized in Table 16. The first block of the table gives the results for the two witnesses in the free recital. One witness reported 62 items and made 5 mistakes, while the other reported 55 with 8 mistakes.

TABLE 16

Effect of Discussion *

	Witnesses		*Individual Jurors*		*Jury After Discussion*	
	ITEMS REPORTED	ERRORS	ITEMS	ERRORS	ITEMS	ERRORS
	62	5	48	6	32	4
	55	8	42	13		
			43	4		
			39	10		
			46	8		
			42	18		
			47	9		
Average			44	10		

* Dashiell

---

[18] Dashiell, J. F. in Murchison's *Handbook of Social Psychology*, page 1136. Worcester, Mass.: Clark University Press, 1935.

In the written accounts, the first juror gave 48, the next 42 items, and so forth, with the mistakes as indicated in the following column. After discussion, the jury agreed on only 32 items, but there were only 4 mistakes in them. The point of greatest interest in the table is the small number of errors made by the jury after discussion as compared with the larger number made by the average juror before discussion. Another experiment points in the same direction.[14] The subjects viewed a short moving picture and then gave a free narration of what they had seen before a jury of twelve to fifteen people. Next they answered 125 questions about the picture. Each juryman, after hearing the witnesses, wrote out his own narration of what had occurred, and also answered the standard series of questions. Then the jury as a group answered the questions on the basis of their discussion. It is not worth while to present the results in detail. In all twenty-four of the juries the performance of the individual juror in answering the questions was appreciably worse than the average of the individual witnesses. (In this particular case, the blanks were scored, number right minus the number wrong.) In all twenty-four cases, however, the jurors did better as a group than they did individually. In a typical jury, for example, the witnesses scored 65, the individual jurors averaged 32, and the jury as a group made a score of 50. Both of these experiments substantiate the value of discussion in the jury. The results come closer to the facts than does the mere average opinion of the jurors.

The Psychology of the Court

Bias. Some psychological characteristics of the judge himself are worthy of note. One of these is possible bias toward the defendant. Although the judge may make a sincere effort to rise above any such tendency, a deep-rooted prejudice may still be effective. On the other hand, if he attempts to compensate for it, he may actually lean over backwards and go too far in the other direction. Such biases develop through the ordinary mechanisms of conditioning. If a person has a number of unfortunate experiences with persons of a certain race or a certain type of physiognomy, he is liable to make an uncritical generalization to the effect that all people of that pattern have those same undesirable traits. This is the same mechanism by which much superstition develops. Someone notes a few dramatic instances of coincidence and forgets the numerous instances which do not conform: he walks under a ladder ninety-nine times with impunity, and the one hundredth time, when a brick falls on his head, he generalizes to the effect that walking under ladders brings bad luck. If prejudice of this sort is known, it is possible to make some appropriate adjustment. There may be some leeway in determining whether an individual shall come before that particular court. Another variable may be the judge's actual tendency toward a conservative or liberal point of view. One judge regards criminals as enemies of society, and another regards them as underdogs. Consequently, it is in point to study the decisions of different courts with a view to determining any general trends of this sort.

---

[14] Dashiell, J. F., *op. cit.*, page 1137.

Predilection for numbers. If a person is asked to select a number between 1 and 10 the chances are that he will usually pick out the same one. For some unknown reason he likes that number. Another tendency is that of thinking in round numbers. Census figures reveal more people at the age of 30 than 31 or 29. This reflects a tendency of people who are uncertain to give a round number. It is quite probable that these same tendencies are operative in the case of many a judge who has to use numbers in connection with sentences. Investigation of actual sentences corroborates this fact.[15] A large number of sentences were taken at random and tabulated to show the frequency of five years, six years, and so forth. There were peaks at five and ten with fewer in between. Similarly, in a tabulation by months, there were peaks at one, three, six, and nine. This doubtless reflects a tendency of the judge to think in terms of round numbers. If every sentence corresponded directly with the culprit's deserts, we would expect as many to be four or six years as five.

Further differences between judges may be seen in a break-down of a considerable number of sentences according to the individual judge.[16] The data are based on six judges in New Jersey, all dealing with common offenses, and to whose courts prisoners were sent at random. Theoretically, then, they should all have given about equal sentences, on the average. Of these six, however, two gave median sentences of six months, two of nine months, another, ten months, and another, twelve months. Obviously, one of them was almost twice as severe as another. Whether this reflects an actual predilection for the number twelve, or a general attitude of greater severity could not be determined. Another item in the same data is the per cent of the cases going through each court that was sentenced to the penitentiary. These per cents are for the judges respectively, 34, 37, 46, 53, 51, and 57. This is quite a range in the severity. The differences between sentences at either extreme and the remaining ones are statistically significant. A criminal brought before a certain court might thus expect a more severe sentence there than he would receive in another court simply because of such a trend on the part of the judge. It might be possible to ascertain the tendency of a certain judge by a tabulation of his sentences. Once the tendency was known, counsel might make some adaptation to it.

---

[15] Coover, J. E., *Experiments in Psychic Research*, page 238. Stanford: Stanford University Press, 1917.

[16] Gaudet, F. J., Harrick, G. F., and St. John, G. W., "Individual Differences in Penitentiary Sentences Given by Different Judges," *Journal of Applied Psychology*, 1934, 18, 675–686.

Summary

Many errors that occur in testimony are due to psychological factors. One source of error lies in the original perception of the event about which the witness later testifies. This perception may be affected by such things as nearsightedness, low illumination, inadequate color vision, or the state of adaptation of the retina. A witness with difficulty in one eye is at a distinct disadvantage in perceiving space. Auditory localization is difficult when the object is equidistant from the two ears. Confusion in tactual localization is frequent if the members are in an abnormal position. Perception of motion is subject to illusory after-effects, and judgment of the speed of vehicles is influenced by irrelevant factors such as noise. If time perception is important legally, it is desirable to determine what the witness was doing during the crucial interval. The general perceptibility of a stimulus depends on its intensity compared to the background against which it is perceived.

The original observation is influenced also by the degree of attention paid to it. Stimuli with certain characteristics catch attention involuntarily. Such characteristics include intensity, novelty, size, contrast, and interest, particularly when related to the witness's vocation. The range of attention is limited so that one cannot report accurately on very many details that were supposedly perceived simultaneously. Accommodation of attention, that is, its adjustment before the event occurs, greatly facilitates observation.

If the original event is seen correctly, there may be, nevertheless, difficulties with memory before the actual testimony. Factors which facilitate memory for details include frequency, recency, primacy, and emotional factors. Mild emotions have a favorable influence, but more violent ones have a disrupting effect on memory. In a constellation of associations many items are interconnected so that any one may bring up any other, and several of them may converge upon a forgotten detail. This principle is involved in taking the witness back to the scene of the crime. Observing with the intent to remember tends to render testimony more reliable. Memory is often supplemented with imagination, however, and it is difficult to distinguish between the two. Many mistakes are made in recognition when it is a question of identifying a present stimulus as something observed in the past. If there are common elements in the two situations, the diverse elements may be overlooked. Accidental mistakes may be minimized by requiring the witness to identify one person from several suspects rather than to make a categorical answer about a single suspect.

Another source of error in testimony arises in the process of securing the information from the witness. Suggestion is apt to enter at this point and may be used quite unintentionally by the examiner or interrogating officer who actually is interested in corroborating his own theory. This difficulty is especially insidious with children, who are more suggestible than adults. The form in which a question is asked influences its suggestive effect. Outright leading questions are usually ruled out but even so may plant a suggestion. Subtle factors such as a negative *versus* a positive phraseology or a subjective *versus* an objective wording of a question make a difference in its suggestiveness. Other sources of suggestion arise through hearing the testimony of other witnesses or even through reading publicity material.

It has been proposed that witnesses be hypnotized and instructed to tell the truth. Although they might operate under this suggestion, nevertheless, they would be generally more suggestible and thus subject to the other sources of error. There is a possibility of minor crimes at least being committed under the influence of hypnosis, although there is no indication as yet of a major crime perpetrated in that manner. There are, however, instances of crimes committed against hypnotized persons. At any rate, the layman should leave hypnosis to the scientists.

Investigations reveal that the method of obtaining testimony has some bearing on its effectiveness. In general, free recital is incomplete but quite accurate, whereas a direct examination yields more complete information but is more inaccurate. The cross-examination is about the same as the direct with reference to completeness but involves even more inaccuracy. Experiments reveal that testimony obtained immediately after the event and transcribed stenographically is superior to oral testimony obtained at a somewhat later time. There are indications that the opinion of a jury regarding guilt changes markedly during the course of a trial. It appears that there is an appreciable advantage to having the last word.

Some problems of a psychological character arise in connection with the jury. Some of the personnel may be preoccupied by other things and give inadequate attention to the trial. A certain minimum of intelligence is necessary in order to deal with many of the technical problems involved. Experiments indicate that jury discussion actually does improve the accuracy of the decision over what would be obtained by merely averaging the individual opinions of the jurors. With reference to the court itself, the judge may have developed biases, just like anyone else, by the process of conditioning; he may even have a predilection for certain numbers and be more inclined to assign such in the process of giving sentences.

13

PSYCHOLOGICAL TECHNIQUES FOR CRIME DETECTION

We have discussed possible miscarriage of justice because the witness, who is trying to tell the truth, may nevertheless make mistakes. We now turn to the person who is under suspicion and may be attempting to conceal the truth. At this point, it is well to clear up one unfortunate item of terminology. The psychologist looks askance at the term "lie-detector," which has been widely used in the press and in popular literature. The name gives a false notion regarding the scientific approach to the problems of crime detection. It suggests something so foolproof that when the suspect is asked a question the instrument will flash a light or otherwise indicate categorically whether he is lying or telling the truth. This is far from the case. What actually happens is that an expert, applying various techniques, studies the record carefully and forms an opinion as to guilt or innocence. The physician does not have a "tuberculosis detector" or an "appendicitis detector." On the contrary, he notes a combination of symptoms, such as body temperature, blood count, location of pain, and on the basis of these symptoms, he makes a diagnosis. In much the same way, the psychological expert looking at a record of breathing, blood-pressure, and electrical resistance of the skin, as shown on a graphic record obtained during examination, comes to a conclusion as to whether the material on the record indicates guilt or innocence of the suspect. Sometimes the term "polygraph" is used to denote devices used for this purpose. This term merely means something that records a number of items simultaneously. At any rate the psychologist resents the term lie-detector, which implies a simplicity and certainty quite at variance with the facts.

We shall discuss a number of techniques which are used for purposes of crime detection separately, merely in the interest of simplicity. In actual practice several types of behavior or several responses are recorded simultaneously on a moving tape, and it is the combination of these which forms the basis of diagnosis. As will be seen presently, it is desirable to have quite a number of these recording devices attached to the suspect just to keep him occupied. If he is trying to circumvent the apparatus and is wearing five or six things that might be recording something crucial, he will find it impossible to control all of them voluntarily and thus deceive the examiner. So it should be borne in mind that these different techniques are applied simultaneously in actual practice.

Confessions

Convenience. Ever since primitive times confession has been a convenient and popular means of establishing guilt. If it is difficult to establish guilt by ordinary evidence, there remains the possibility of inducing the suspect himself to admit guilt. Unfortunately the securing of a confession sometimes has been set up as a major objective regardless of whether the individual is actually guilty or not.

Third degree. The conventional procedure for obtaining confessions in medieval times was to torture the suspect until he confessed or succumbed in the process. Psychologically considered, this procedure flies in the face of science. The person who is physically uncomfortable becomes more suggestible and often reaches the point where he will say almost anything in order to get relief from being tormented. This procedure undoubtedly caused many false confessions. The modern counterpart of these medieval methods is the third degree, which apparently is practiced in some instances, although the fact is vigorously denied. Here again, the assumption is made that the suspect is guilty and that it is desirable to put enough pressure on him so that he will admit that guilt. Suggestibility is heightened by loss of sleep, fatigue, a long examination, and, in some instances perhaps, physical violence. The press sometimes states that a suspect confessed after being questioned for eight hours by the detectives working in relays. The psychologist who wishes to avoid suggestion certainly would not follow this procedure. It is small wonder that many confessions obtained under some degree of pressure are subsequently repudiated.

Pathological confession. In some cases confessions are made because of the pathological condition of the suspect. Persons do develop delusions that they have killed someone or committed some crime. Many melancholics are perturbed over things which they think they have done. A man confessed to killing his daughter and burning her body, but she was found in good health, and the father was diagnosed as psychotic.

Such individuals usually would be detected by an examiner with clinical training. At least, one should be on guard against an occasional confession of this type.

Ulterior reasons. Sometimes a person confesses for some reason beyond the crime itself. There have been instances where a person confessed to some minor offense in order to get locked up for the night and secure food and lodging. Another practice is to confess to one crime as an alibi for a more serious one. A man who committed murder confessed to a burglary in another part of the city at the same time. In some instances the offender actually hurries across town to commit petty larceny and get apprehended very soon after a major crime.

Confession after incriminating one's self. A type of confession that sometimes develops where scientific methods of crime detection have been employed is the confession which occurs after the suspect feels that he has incriminated himself in the examination. Many times, when a person is being examined with some of the psychological techniques he becomes confused in his story at some point, notes the way the examiner is looking at the record, and feels that he has betrayed himself. Under those circumstances he sometimes confesses. Then again, he may be more or less invited to confess by being shown his own polygraph record, having it pointed out that it looks suspicious at certain points, and being asked if he can explain those points. Quite frequently, under those circumstances he "comes clean." It should be emphasized, however, that in this instance very little suggestion is involved. The examiner does not insist that he is guilty, or even urge him to confess, but merely confronts him with the record, and asks him if he can explain it. The examiner, moreover, does not do this unless he really believes, on the basis of the record, that the suspect is guilty. A confession obtained under these circumstances is probably reasonably sound.

Early Efforts at Crime Detection

Efforts to determine guilt from behavior of the individual are not recent. On a papyrus from about 900 B.C., there are instructions for detecting poisoners, including the fact that, "He speaks nonsense, he rubs his toe along the ground, and shivers, his face is discolored and he rubs the roots of his hair with his fingers."[1] In Syria, about 300 B.C., a physician was feeling a man's pulse when they were discussing some questionable behavior, and the speed of the pulse made the physician suspicious. The suspicions were later confirmed by other evidence.

---

[1] Trovillo, P., "A History of Lie Detection," *Journal of Criminal Law,* 1939, 29–30, 104–119, 848–881.

These cases suggest the present-day use of involuntary behavior as diagnostic of deception. Some ordeals have a slight semblance of a scientific basis although others, like applying the tongue to a red-hot iron, are farfetched. In the middle ages the suspect was required to eat some bread and cheese after someone had prayed that if he were guilty, it would stick in his throat. Along the same line is the chewing of rice in the Orient. It is possible for emotion to inhibit the action of the salivary glands and render the swallowing more difficult.

There was nothing very similar to modern techniques until sometime in the nineteenth century when preliminary efforts were made to record involuntary responses while the suspect was answering questions. Mosso investigated the volume of the forearm by placing it in water and recording the displacement of the water pneumatically. A man suspected of a robbery, for example, showed a slight drop in volume when that particular crime was mentioned. Suggestions were made by Munsterberg at the International Congress of Experimental Psychology in 1892 that some of these bodily changes might reflect the emotions involved in deception. It was some twenty years later before scientific investigation of this field led to worth-while results.

Association-Reaction Technique

General aspects of technique. The association-reaction happens to be the first technique that was employed in any systematic fashion. It is not used widely at the present time. Crime detection laboratories and large police departments utilize other methods which will be discussed presently. The association-reaction has been used quite a bit, however, in private examinations conducted by scientists in solving cases informally without access to law. At any rate, it has some interesting features which are worth presenting.

The technique involves essentially the presentation of stimulus words to which the subject responds with the first associated word. If the examiner says, "dog," the suspect probably responds, "cat." Some of the words are ordinary and others pertain to the crime. Moreover, the time required to make each response is recorded by appropriate apparatus. A common procedure involves voice keys, which consist of a diaphragm of very thin metal a few inches in diameter, arranged with an insulated contact in the center and with a small hammer hanging from the top of the rim and resting very lightly against the contact. If the examiner speaks into the diaphragm the air waves from his voice move it enough to bounce the hammer away from the contact in the middle of the diaphragm and momentarily break the connection. By means of a not-very-complicated circuit, this arrangement can be made to start a chronoscope, which is simply a constant speed motor with an electromagnetic clutch whereby the hand in front of the dial can be thrown into gear with the motor or pulled out of gear. The voice key controls the current through this magnet. The suspect has another similar voice key and the circuit can be arranged so that when the examiner speaks into his key the hand on the chronoscope begins to revolve, and when the suspect speaks into his key, the hand stops. If the hand rotates, say, once a second, by dividing the dial into a hundred units, it is possible to measure the reaction time in hundredths of a second.

Criteria of guilt. The general principle involved in the test is that certain of the stimulus words will produce an emotional disturbance in a guilty suspect which may influence the reaction time or may betray the suspect by the nature of the word with which he responds. The data may be evaluated in two ways, quantitatively and qualitatively. The former deals with the reaction times as recorded by the chronoscope. Some of these are for crucial words, which are related to the crime, and others for non-crucial, or control, words. It is probable that some crucial words for a guilty suspect will produce an emotional disurbance so that he becomes confused and his reaction time is slower. Or the crucial word may remind him immediately of another word, which, in itself would be incriminating by revealing undue familiarity with the details of the crime. If he is aware of this, suppresses the incriminating word and seeks a less critical one, he loses time as revealed by the chronoscope.

It is common practice to make an initial analysis by grouping together the crucial and the non-crucial words and striking an average for each. This procedure is clarified by an example in Table 17. The first column

TABLE 17

Typical Association-Reaction Time Results. (time in seconds.)

	Non-crucial time	*Crucial time*	*Non-crucial*		*Crucial*	
			Time	*Deviation*	*Time*	*Deviation*
	1.3	1.0	1.2	+.1	1.0	— .1
	1.0	2.1	1.0	—.1	2.0	+ .9
	1.3	1.4	1.0	—.1	.8	— .3
	1.2	3.0	1.1	0	.8	— .3
	1.2	1.5	1.2	+.1	.9	— .2
Total	6.0	9.0	5.5	.4	5.5	1.8
Average	1.2	1.8	1.1	.08	1.1	.36

gives the reaction times for five non-crucial words, and the second column for five crucial words. Statistical analysis would never be made of a case like this with only five words of each sort, but the example is over-simplified for illustrative purposes. Totaling and averaging each column yields 1.2 seconds for the non-crucial words and 1.8 seconds for the crucial words. This general trend for the suspect to be slower in the latter case at least appears suspicious. However, the difference between these averages is not conclusive unless it is demonstrated to be statistically significant. (*Cf.* page 93 and Appendix 2.) It is necessary to determine the critical ratio—that is, the difference divided by its standard deviation—and this indicates the probability that if the experiment were repeated, the difference would still be in the same direction.

Another type of quantitative analysis of the results involves the variability of the reaction times. A clever suspect might, by deliberate effort, slow down on the non-crucial words and speed up on the crucial. He might thus contrive to equalize the averages because the occasional genuine emotional inhibition which delayed a crucial response would be offset by some voluntary retardation for words in the other list. However, these deliberate efforts would serve to increase the variability of the reaction times to crucial words even though the average remained equal to that for the non-crucial. Although the occasional emotional disturbance might produce a very marked retardation which might be offset by a very prompt response to another word, the result would be a considerable scatter or variability. The deliberate retardation on non-crucial words would be more uniform because of the absence of emotional factors. Data illustrating this aspect appear in the right portion of Table 17. The two types of reaction time (Columns 3 and 5) both average 1.1, which would suggest offhand that the suspect was innocent. However, the average deviations as computed in columns 4 and 6 reveal a difference. Such computation involves merely taking the deviation of each particular time from its average, disregarding the signs of these deviations, and averaging the absolute values. The average deviation of .08 for the non-crucial words as against .36 for the crucial suggests guilt. Other measures of variability would be equally applicable—such as the standard deviation which involves squaring the deviations, averaging those squares, and taking the square root.

In addition to analysis of average times and variability, it is a good idea to look at the individual words and reaction times in detail. If there is an especially long reaction time it is of interest to note what the actual response word was. This shades over into the qualitative aspect of the analysis. If, for example, the crime under investigation involved red ink, and the suspect, when given the stimulus word, "red," replies with the word, "ink," it looks more suspicious than if he gives "rose," or "sunset," or "hat." It is a matter of associations which he would not be apt to have unless he had been through the crime himself. A basic requirement in the technique is the selection of words that are really crucial in the sense that they suggest something connected with the crime to the guilty party but do not carry such suggestion for an innocent party. It is difficult to secure such crucial words after the crime has been publicized. If, for example, somebody was shot with a revolver, and this fact is universally known, then the stimulus word, "revolver" reminds guilty and innocent suspects alike of the crime. It is thus necessary to dig more deeply into the details and find items which have escaped publicity. This particular technique often has been used informally before the case was discussed with the police at all. For example, in a dormitory theft the money actually had been hidden on a shelf in a closet underneath a shirt. No one knew this fact, however, except the person who had lost the money, the examiner, and the culprit. In this instance the word "shirt" was a good crucial word. A person who had actually taken the money from under the shirt would undoubtedly think of money when "shirt" was mentioned. With other suspects, however, shirt would suggest necktie or collar. The whole technique almost stands or falls according to how successful one is in making up a list of actually crucial words.

Another possible complication is stereotyped responses. Frequently, the subject will give the same response time and again. To the stimulus word, "oak" he replies "tree." Later he gives the word, "tree" in response to such words as "house," "food," "ink." The most obvious interpretation is that he has this word ready and when he gets confused on a crucial word, gives this stereotyped response. If this occurs very frequently, it suggests that he is getting blocked on crucial words, and that this is his way out, whereas an innocent person would not have to resort, even unconsciously, to these stereotyped responses.

Precautions. A few other precautions should be mentioned in addition to the general one of selecting crucial words that are actually crucial. One of these precautions deals with the grammatical aspect of the words. A study was made of association-reaction times with different parts of speech as stimuli.[2] The material involved modifiers like "black" and "small," nouns like "chair" and "table," and verbs like "jump" and "run." A trend was found for the modifiers to yield the quickest reaction time, with the nouns next, and the verbs the slowest of all. Thus, if most of the non-crucial stimulus words were modifiers and most of the crucial words were verbs, there would result a spuriously slow average for crucial words, not because of emotional disturbance but merely because of the part of speech used. Hence, it is advisable to balance the crucial and non-crucial words according to the different parts of speech.

---

[2] Crane, H. W., "A Study in Association-Reaction and Reaction Time," *Psychological Monograph,* 1915, 18, No. 80, 14 ff.

A minor point which sometimes influences results is the effect of strong habitual associations. There may be some common associations like grape-juice or Ivory soap which are so firmly fixed that they come out in spite of some conflicting association due to the emotion connected with the crime. Usually, there are not so many of these that they upset the results appreciably.

Variations in technique. In some instances it has been profitable to go through the list of words a second time, instructing the suspect to give the same responses which he gave the first time. If he is innocent and always responds with the first words which occur to him, it is highly probable that his second rendition will involve the same words as the first because he is following his normal reactions without any inhibition. If, however, he is guilty, and on the first occasion suppresses the immediate association and looks around for a less incriminating one, he may have some confusion when the list is repeated a second time. For instance, in the case mentioned involving the shirt and the money on the first time through the list at the stimulus word, "shirt," the suspect might think of "money" but suppress that and a moment later come out with "collar." When he goes through the same list again "shirt" would suggest "money" as before but he might not remember so readily what his secondary association was, simply because it was not as vivid at the time. Thus he might say "necktie" instead of "collar." This immediately looks suspicious because if he had been proceeding naïvely on both occasions, he probably would have given identical responses.

Another possibility is to vary the actual method of presenting the words. Instead of the examiner speaking them he may present them visually. This method can be implemented by having the words typed on small cards and placed in a magazine behind an opening in a screen. A shutter covers this opening and drops when a lever is pressed. When the shutter drops it makes an electrical contact which starts the chronoscope just as the examiner's voice key does. The subject has a voice key just as in the oral technique and responds in similar fashion. The shutter can be moved into position again to cover the opening while the first card is pulled out of the magazine, leaving the second one ready for exposure. One advantage of this method of presentation is that it avoids possible misunderstanding of the auditory stimulus. Occasionally the suspect actually fails to understand the word spoken by the examiner, but sometimes he merely pretends to fail to understand, and it is impossible to check upon the genuineness of this failure. With the visual presentation, however, the suspect has no such excuse. If the word is by chance a bit unusual to him, it is right there and he must keep looking at it until he does understand it.

Another variation on the association process that is occasionally used, although it is not strictly an association-reaction technique, is something on the order of a completion test. This consists of a paragraph with certain words omitted which the subject must supply. If the text discusses a crime similar to the one for which the subject is under suspicion, it is possible that in filling in the blanks in the test he may draw from his own experiences. This is a bit like the projective techniques discussed in connection with clinical diagnosis. The procedure is qualitative and only on rare occasions has it been very useful. Another variation which has been successful occasionally is to have the subject give free associations as fast as they come to him. He starts off with the stimulus word and gives his first association which suggests another one, and so forth—a whole train of associations. If the subject is pressed to keep on, he may ultimately come out with some associations that are incriminating. This procedure is similar to the psychoanalytic techniques of running down a series of associations in order to detect some mental maladjustment.

Luria technique. Special mention should be made of a supplement to the association-reaction technique involving a pneumatic reaction key. The subject presses this key synchronously with his oral response, but the key records the actual position of his finger continuously. The technique was first used by a Russian psychologist and is often described as the "Luria technique."[3] It requires a moving tape for recording the finger motion as well as the electric responses of the voice keys. The best procedure for pneumatic recording of this sort employs a small metal bellows which comprises several circular sections of very light metal and is airtight. If one end of the bellows is held rigidly and the other is pressed slightly, there is a compression of the air in the bellows which can be transmitted through a rubber tube to appropriate recording apparatus. This latter may be a similar bellows which has one end mounted rigidly, and the other end goes in and out with the changes in pressure and can be arranged to actuate a recording marker. This type of bellows is standard equipment in recording pneumatic changes such as those involved in the various crime detection techniques. In the present instance the first and second fingers of the subject's hand are clamped lightly to the top of such a bellows or, better still, to one end of a lever, the other end of which presses on the bellows. Thus, as the subject moves his fingers up and down with very little resistance from the system itself, he expands or contracts the bellows, changing the pressure in the system. This, in turn, actuates the recording bellows which carries a very light pen, similar to those used on recording thermometers. If the subject presses down with his finger, there is a deflection in the line which the pen traces on the moving paper tape.

---

[3] Luria, A. R., *The Nature of Human Conflict.* New York: Liveright, 1932.

To facilitate comparison of the manual response with the verbal response, the voice keys are connected through appropriate relays to an electromagnet which operates another recording pen on the tape. The circuits can be so arranged that when the stimulus word is given there is a little drop in the line, which remains on a new level until the subject's response is given. Some typical records are shown in Figure 10. The earlier portions of the records are at the left and the later portions at the right. At *A* and *B* in the figure, the upper line is traced by the electromagnetic pen and the length of the lower section of the line is the actual reaction time. Just below that is the line traced by the recording bellows connected with the manual response bellows. The pens from the electromagnet and from the bellows are aligned so that if the verbal and manual responses are synchronous, the two indications on the record are directly in line vertically. This is essentially the case in Example *A*.

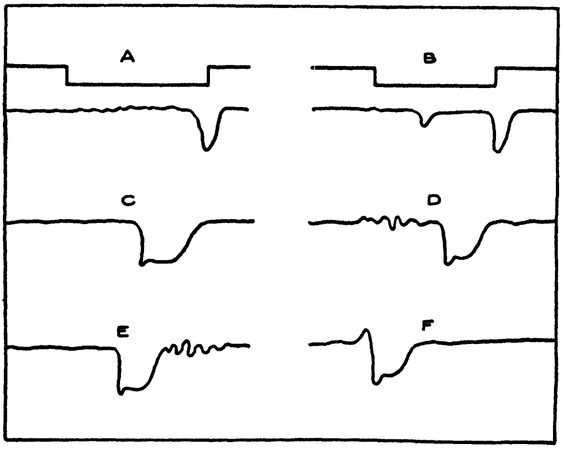


Figure 10. Typical Manual Response Patterns (Association Reaction).

For the Luria technique the usual association-reaction method is carried out with the additional aspect ot pressing the pneumatic key synchronously with the oral response. The right hand is used for this purpose if the subject is right-handed and *vice versa*. The other hand usually is attached to a similar apparatus, but the subject is not supposed to move that hand at all. Tremors or involuntary movements with that hand may be diagnostic. A variety of criteria for the preferred hand have proved diagnostic in different cases in interpreting these records. One of the most significant types of response is that indicated at *B* in Figure 10. There is a slight premature motion followed ultimately by the correct synchronous motion. This reflects the fact that the subject thought of an incriminating word, suppressed it, and did not speak until he found a more innocent word. However, although he suppressed his actual speaking of this incriminating word, he was not able to suppress his entire motor adjustment. He was so set to press the key as he spoke that when he merely thought of speaking, he made an incipient reaction with the key. This crucial type of response has been found by a number of investigators.

Subjects do not all respond with a uniform manual pattern. There are marked individual differences in the method of operating a key of this sort. Sometimes, instead of a quick pressure and an immediate release as in *A* and *B* (Figure 10), the key is pressed down and held for an instant before being released as in *C*. Other subjects show a preliminary tremor as in *D*, or a subsequent tremor as in *E*, or even pull up on the key a bit just before pushing it down as in *F*. Various criteria have been found diagnostic in different investigations. One of these is the actual tendency to synchronize the two responses. There are indications that some guilty suspects tend to put the manual response a little too early on crucial words. Apparently the set to react, when it is complicated by possible emotional disturbances, emerges through the hand a little more quickly than through the speech mechanism. Another criterion is the length of time between the pressing of the key and its final return to normal. In Example *A* this would be the length of the break in the main line where the indentation occurred. It has often been found in patterns like *C*, that the length of the horizontal portion of the bottom of the trough is diagnostic. Other studies have suggested that the actual extent of the depression is significant. There is no universal criterion. Different investigators have found different methods of analysis profitable.[4]

In some cases it is necessary to interpret the results largely in qualitative fashion. By looking over the complete graphic record of a suspect, it is possible to determine the pattern which seems to be typical of that particular individual. Atypical patterns may then be noted and checked on the record. It is well to do this at first without reference to the stimulus words and without actually knowing which responses involved crucial words. After the decision is made as to which manual responses are atypical the key is consulted to see if more of the atypical responses did occur on the crucial words.

---

[4] Burtt, H. E., "Motor Concomitants of the Association Reaction," *Journal of Experimental Psychology,* 1936, 19, 51–63; also Runkle, J. E., "Luria's Motor Method and Word Association in the Study of Deception," *Journal of General Psychology,* 1936, 15, 23–37; and Gardner, J. W., "Experimental Study of the Luria Technique for Detecting Mental Conflict," *Journal of Experimental Psychology,* 1937, 20, 495–505.

As mentioned above the non-preferred hand is attached to a similar pneumatic key. Occasionally something diagnostic appears here. The hand is supposed to be kept motionless, but an emotional disturbance may cause some involuntary movements. Another value of the recording mechanism for this hand is that it constitutes one more thing for the suspect to watch. As indicated earlier, the more contraptions there are attached to the subject the more difficult it is for him to control all the aspects of behavior that he thinks are under scrutiny.

Actual use. The association-reaction technique has not been employed much in connection with actual court cases or police examinations. In these instances more use has been made of other techniques such as breathing and blood pressure. Most of the instances in which the association technique has been used in crime detection have been handled privately by interested psychologists before the case reached the legal stage at all. This often occurs in a university community. Usually these cases are not reported in the technical literature unless they develop some new aspect which might be of scientific interest. Consequently, it is difficult to estimate the extent to which this technique is used. However, a few reports have appeared:[5] one such report involved solving a number of thefts around fraternity houses; another case was reported from Toronto where a young man came in, apparently from the north country, and told a wild story of having lost his dog team, traced the thief to the city, and then run out of money. A local psychologist gave him an association test and on stimulus words dealing with current events, such as sports, he gave much more up-to-date associations than would a person who had lived up in the north as he claimed. It developed ultimately that he had come from Cincinnati. Luria himself, used this technique, which included the association-reaction and the manual response, on quite a few criminals.[6]

---

[5] See Crossland, H. R., "The Psychological Method of Word Association and Reaction Time as Tests of Deception," University of Oregon Publication, January, 1929, *Psychology Series*, Vol. 1, No. 1.

[6] Luria, A. R., "Die Methode der Abbildenden, Motorik in der Tatbestands-Diagnostik," *Zeitschrift für Angewandte Psychologie*, 1930, 35, 139–183.

Breathing As Diagnostic of Deception

Bodily changes in general. The association-reaction technique deals with disturbances in a voluntary process that are diagnostic of guilt or innocence. The other criteria to be discussed involve variations in an involuntary reaction on the part of the suspect during examination. It has long been known that some bodily changes were involved during deception. Many a liar has noticed a little increase in his heartbeat, or a rush of blood to his face, or a variation in his breathing. Those who have observed other people who are practicing deception may have noticed such things as a twitching of the lips, a shifty eye, a forced laugh. The problem for the scientist is to record bodily changes such as breathing, which vary somewhat during emotional conditions, so that they can be analyzed with a view to detecting deception.

Recording techniques. A technique for securing a graphic record of breathing which can be analyzed in detail, conventionally employs a pneumograph which consists of a rubber tube, somewhat less than an inch in diameter and about a foot long, with a light, coiled spring inside to keep the rubber from collapsing. Two light metal supports are attached at each end, and one of them has a small hollow nipple connecting with the interior. The pneumograph is fastened around the chest with a string or a chain at the back and is adjusted so that it is reasonably tight. The air pressure inside the pneumograph decreases and increases as the subject inhales or exhales. A small rubber tube is attached to the nipple and leads to a recording mechanism. This mechanism may be of the metal bellows type, which traces on the tape a wavy line indicating inhalation and exhalation. Typical tracings are shown in Figure 11. The wavy curves at the top of each section of the figure are the breathing curves. An upward movement of the curve indicates inspiration and *vice versa.* If the subject holds his breath, the line is horizontal. Rapid breathing is indicated by more oscillations within a given horizontal distance on the record, and deeper breathing by greater amplitude of the oscillations.

It is advisable for some subjects, at least, to use two pneumographs recording separately on the same tape. One is placed high on the chest and the other lower toward the abdomen. The reason for this is that sometimes the slight pressure created by the pneumograph causes the subject to shift his breathing. If the pneumograph is high, he breathes with the lower part of the lungs and *vice versa.* With two pneumographs an adequate record is obtained from at least one locality. The two records are practically synchronous. It is well to have on the record a tracing

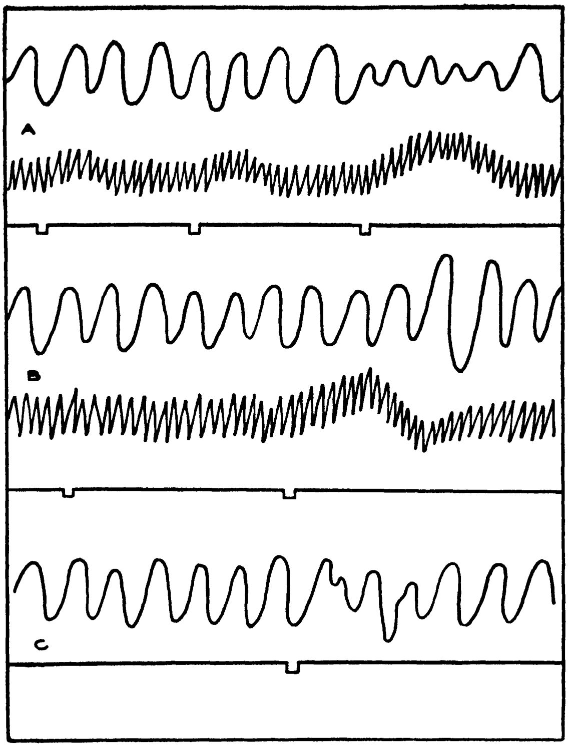


Figure 11. Typical Breathing and Blood Pressure Records.

which shows just when each question was asked. Such lines are shown in Figure 11. They are straight except for small notches appearing at the points where the questions were asked. The pen making this tracing can be operated either mechanically or electromagnetically by means of a push button. The examiner may also write on the record with a pencil to indicate the number of the particular question that was asked. Sometimes another pen makes a mark every second to give a record of the elapsed time. This can be ascertained without the special pen if the speed of the moving tape is known.

Conduct of the examination. The breathing record is taken continuously during the oral examination of the suspect. It should be emphasized again that, in actual practice, a number of other things beside breathing are recorded simultaneously. The general procedure of conducting the examination is the same for different diagnostic techniques with the exception of one aspect of breathing—the inspiration-expiration ratio. Some of the following discussion therefore applies to any of the techniques. The suspect is asked a series of questions, some of which are crucial and some of which are control—it is certain that he will not answer them falsely. By comparing the graphic record taken during responses to crucial questions with the record for control questions, it may be possible to determine whether or not the suspect is lying. It is inadvisable to use the technique during the ordinary interrogation like that conducted by police officials, which is pretty much *ad lib,* but it is preferable scientifically to prepare the set of questions systematically and observe various precautions and practices. One such precaution is to limit the questions to those which can be answered categorically, "Yes" or "No," or at least, answered by only a very few words. The main reason for this is that the mere process of speaking influences some of the slight bodily changes which are being recorded. Sufficient activity of almost any muscle group, in this case the speech muscles, affects the blood pressure. Extensive speaking produces obvious irregularities in the breathing curve because it is necessary to take a breath after every few words which makes the interpretation of the breathing record difficult. Hence, it is standard practice to employ questions that require very brief answers. It is also common practice to begin with some casual questions about everyday things: what the suspect had for breakfast, what kind of movies he prefers, his opinion about baseball, and the like. These questions serve to get him accustomed to the examination situation and also serve as a partial control. Then, it is well to have other control questions dealing with the crime which the suspect is certain to answer truthfully. He might be asked if the victim was shot with a revolver, an item that everyone knows. The suspect tells the truth about this, but since it is in the crime context, if he is somewhat excited about the whole situation, that is revealed on the record. As will be noted later, it often is a matter of discriminating between when the person is telling the truth but nevertheless is excited about the whole situation, and when, in addition to this normal disturbance, he is telling a falsehood with its additional increment of excitement. After the initial controls, the examination then proceeds to more crucial questions on which a guilty suspect would presumably lie and an innocent one tell the truth. These are interspersed with further control questions. Frequently, it is desirable to work up to a crucial point in the interrogation, return to some normal questions, and work up again to see if the polygraph record correlates with this sequence. In the best practice, the examiner takes a neutral attitude. He does not begin his questioning as though the suspect were guilty, for this smacks too much of the third degree. The examiner relies on the involuntary changes manifested in the record rather than on insisting that the person is guilty or getting him tangled up in his discussion. It is all right to box him in with critical questions, but from the scientific standpoint, the examiner himself should avoid undue suggestion and should pursue the interrogation in a straightforward manner. There have been investigations under laboratory conditions in which some examiners obtained unreliable results just because they were too aggressive. The situation was improved in one instance of this sort by having the questions typewritten and merely handed to the suspect by the examiner, which eliminated the element of suggestion involved in the examiner's personality.

Sometimes it is advisable to go back over the same questions a second time. The suspect may be told that this is going to be done and that if he answered truthfully in the first instance he will merely repeat his former answers. This repetition has the effect of calming the innocent person somewhat and frequently his record will show less excitement than it did on the first round. The guilty suspect, however, is still under tension, and the record appears about as it did the first time. It is also possible to compare the two responses to any specific critical questions.

A variation in the interrogation technique has proved useful in some instances when there were certain items about the crime that presumably would be known only to a guilty suspect. This is analogous to the crucial words discussed above in connection with the association-reaction technique. An instance would be a burglary in which there had been no publicity as to what items actually were taken so that presumably only the guilty suspect would be familiar with that detail. The suspect is shown several objects, such as a watch, a bracelet, and a stick-pin. He is told that an object similar to one of these was stolen, and that he is going to be questioned as to whether he stole one like each of these objects. Of course he says "no" as each one is presented. However, if he actually did steal a bracelet he may show a differential response when denying that particular item indicating, as it were, a peak in the tension shown on the record. He may also manifest some indication of relief after the crucial item has been passed, because he probably was worrying about it and when it is over, relaxes a bit. This particular technique has not been very widely used and, of course, is limited to situations such as those described.

Usual interpretation. The breathing record is, in many instances, interpreted merely by inspection. The most frequent finding is simply a greater irregularity on the crucial words for the guilty party. This is shown in record *C* in Figure 11. It requires considerable skill on the part of the examiner to look over the control questions and get an idea of the general pattern of breathing, then scrutinize the crucial questions and see if they appear to differ significantly. To make this type of analysis in the most effective manner, the examiner should go through the record blind, that is, without knowing which questions were control and which were crucial. He gets an over-all impression of the general trend, then spots those cases where the breathing appears irregular and marks them with some symbol. Then he checks with the key to determine if the ones he marked were predominantly crucial questions.

A more specific trend that sometimes is diagnostic is a suppression of breathing. This is shown in the breathing curve at *A* in Figure 11. Another occasional characteristic is deeper breathing twenty or twenty-five seconds after the question. This is shown in *B,* Figure 11. It may be caused by relief after the question has been answered, possibly the conventional sigh of relief. It appears to characterize only certain kinds of suspects. The foregoing are the usual methods followed in interpreting the breathing record.[7]

Inspiration-expiration ratio. One refinement of the analysis of the breathing record should be mentioned, although it is not very generally used. It was first suggested by Benussi [8] who found something diagnostic in the ratio between the times spent inhaling and exhaling. If a person takes a quick inhalation and breathes out more slowly, the ratio is small, and *vice versa.* Comparing this ratio for a few breaths before the suspect gives his answer with corresponding ratios after his answer, may reveal significant changes. It is simple, although tedious, to secure the necessary data from the ordinary polygraph record of the breathing curve. Inasmuch as the paper runs at a constant speed, it is merely necessary to project on a horizontal base-line the points where the breathing curve starts up or down. The linear distance along the base-line is in direct proportion to the time of inhaling or exhaling. These distances can be measured with a convenient scale and the ratios computed. Special instruments have been devised to simplify this procedure, but it is not worth while to describe them in detail at this point.[9] The pneumograph may be connected to a unit which makes an electric contact during inspiration and leaves the circuit open during expiration. With such a device it is possible to record two lines on a moving tape which can be measured with a scale, thus obviating the necessity of projecting the peaks of the ordinary curves down to the base-line. The circuits may be run through electric counters which can be read alternately, each counter operating, for example, ten times a second. It is even possible to have the circuits operate two small cars moving intermittently at right angles and actuating a pivoted hand in such a manner that the ratio can be read directly on a scale in terms of the angle through which the hand moves.

---

[7] For more detailed discussion of these techniques and for examples from polygraph records taken under actual conditions of criminal investigation, see Larson, John A., *Lying and Its Detection.* Chicago: University of Chicago Press, 1932; also Inbau, F. E., *Lie Detection and Criminal Interrogation.* Baltimore: Williams and Wilkins, 1942.

[8] Benussi, V., "Die Atmungssymptome der Lüge," *Archiv für die Gesamte Psychologie,* 1914, 31, 244–273.

[9] Burtt, H. E., "Further Technique for Inspiration-Expiration Ratios," *Journal of Experimental Psychology,* 1921, 4, 106–110.

To apply the inspiration-expiration technique, it is necessary to revise the method of examination somewhat because the technique requires several breaths before the answer and several after the answer. The suspect is told that when a question is asked, he is merely to think about his answer until given a signal "Now," whereupon he is to give his answer, and then remain silent until the next question. The method of handling the data can be explained by an example giving the analysis of the breathing for a single question. This appears in Table 18. The examiner asks a question. Then, in the first following breath, the suspect spends 3 seconds inhaling and 2 seconds exhaling. The ratio of 3 to 2 is 1.50. The next breath involves 1.2 seconds inhaling and .8 seconds exhaling. After four complete breaths, the examiner says, "Now," and the subject gives his negative answer. In the next breath the inspiration time is 2 seconds, the expiration time 3 seconds, and the ratio .66. In most cases it is satisfactory to average these ratios for the few breaths preceding and the few breaths following the answer. The interpretation proposed by Benussi and subsequently corroborated by others is that when the subject is telling the truth, the tendency is for the average I/E ratio to be greater before the

TABLE 18

Computation of I/E Ratios

Question: "Were you at Broad and High Streets on October 17th?"

I	*E*	*I/E*
3.0	2.0	1.50
1.2	0.8	1.50
1.4	1.4	1.00
2.0	1.6	1.25
	Average................................	1.31

Signal: "Now"

Answer: "No"

I	*E*	*I/E*
2.0	3.0	.66
1.8	1.8	1.00
1.6	2.0	.80
1.2	1.0	1.20
	Average	.91

answer than after the answer, whereas in the case of deception, the ratio averages less before the answer than after. In the example of Table 18 the presumption is that the person was telling the truth because 1.31 is greater than .91. This principle does not hold consistently on every question in a record but empirically it does work out in this general direction.

The theoretical basis for this trend is not at all clear. Presumably there is a difference in emotional condition when a person is confronted with a question and is planning the answer, and when the answer has actually been given. In many instances it seems like a shift from tension to relief. Why this would cause a shift in the I/E ratio is not known. It has been suggested that it may be related to the gasp-of-surprise mechanism. A gasp would involve a small I/E ratio and that is more apt to precede a false answer.

General results. Most of the practical results reported have been based on inspection of the breathing record rather than detailed quantitative analysis. The over-all interpretation is based on a combination of diagnostic procedures such as breathing and blood pressure; it is seldom based on one technique alone. It may be profitable to get a rough notion of the comparative success of breathing and some of the other criteria in detecting falsehood. In one investigation the inspiration-expiration ratio was analyzed carefully and a decision was made regarding the guilt or innocence of the subjects in some artificial crimes which nevertheless involved some emotional content. The blood pressure was also analyzed at the same time, and it was possible to determine the diagnostic success of the two methods. On the basis of the inspiration-expiration ratio, 73 per cent of the cases were diagnosed correctly, whereas with the blood pressure the success was 91 per cent.[10] These per cents should not be taken as a final measure of the degree of success of these methods in general, but they do give an indication of the relative effectiveness of the two procedures.

Blood Pressure and Crime Detection

Technique. Two aspects of blood pressure are measured routinely by the medical profession—systolic and diastolic pressure. The systolic is of interest to the psychologist in crime detection work; it is the pressure in the phase of the heart beat when the valves are open and the blood is rushing out through the arteries. The diastolic pressure exists when the valves are closed. The systolic pressure is more responsive to innervation from the sympathetic nervous system, which is involved in emotional conditions. Diastolic pressure depends more on the condition of the arteries and is not very responsive to the attitude of the subject. The earlier work on crime detection measured the systolic pressure periodically in conventional medical fashion, but more recent practice employs a continuous graphic record.

---

[10] Burtt, H. E., "The Inspiration-Expiration Ratio During Truth and Falsehood," *Journal of Experimental Psychology,* 1921, 4, 1–23.

Everyone is familiar with the usual technique of measuring blood pressure. A rubber cuff is placed around the upper arm and inflated by squeezing a bulb until the pressure is sufficient to stop the circulation to the lower arm. Then a slow leak is opened in the system, and the pressure is gradually reduced until it reaches the point where the blood pressure can just overcome the pressure of the cuff, and the pulse rushes through the artery to the lower arm. If the physician listens with a stethoscope at a point below the elbow where the artery is near the surface, or even feels the pulse at the wrist, he can detect the first pulse beats, which come through with an especially heavy thud. A manometer—which may consist of a U-tube containing mercury—is connected to indicate the actual pressure in the cuff. Changes in pressure in the cuff force the mercury column up or down, and the difference in the level in the two branches of the U-tube indicates the actual pressure in the system. It is customary to record this in terms of millimeters of mercury. Another type of manometer has a piston which is actuated by the pressure and which is arranged to make a hand rotate in front of a calibrated dial. If the examiner reads the manometer at the instant that the first pulse beat through the cuff is noted, he has essentially the systolic pressure because the pressure in the artery is just enough to overcome the pressure in the cuff. By reducing pressure further in the cuff and listening for a different type of sound he measures diastolic pressure also.

Much of the early work with blood pressure as diagnostic of deception used this conventional technique, taking a reading every minute or two during examination. More frequent readings were painful. The method was reasonably successful and rises in blood pressure synchronous with crucial questions were diagnostic of falsehood. However, it soon became apparent that the technique was lacking because significant things happened between readings. Subjects who participated in experiments involving artificial crimes sometimes admitted that they told a lie between readings and were excited but managed to calm down before the next reading. The obvious need was for a continuous record of the blood pressure on a moving tape or polygraph. A number of techniques for this purpose have been devised. It is possible to get a graphic record of actual systolic pressure, but this is not very feasible under practical conditions. It involves two cuffs around the arm, and an arrangement whereby a slow leak in the upper one is automatically shut off by the lower when the first pulse beat comes through and the upper one is immediately blown up again until the pulse is cut off. In this way the pressure is maintained at approximately the systolic level continuously, and a recording manometer puts it on the polygraph. The apparatus, however, is difficult to keep in adjustment, and it becomes uncomfortable in a short time to have the circulation completely cut off in the forearm. The emotional disturbance produced by this discomfort may be greater than that produced by lying.

Standard practice now employs a single cuff around the upper arm or, in some cases, around the calf of the leg. A moderate pressure of 30 to 80 millimeters is maintained in this (systolic pressure is generally 120 or more), and an appropriate recording mechanism yields a polygraph tracing which is a function of systolic blood pressure and goes up as pressure goes up and *vice versa.* This is a relative rather than an absolute indication of the blood pressure, but is all that is necessary, for, as will be indicated later, it is changes on the crucial questions relative to the control questions that are important in diagnosis. Some typical tracings are shown in Figure 11. The rapid oscillations indicate separate pulse beats, but the peak of these beats is roughly proportional to the blood pressure. When the general trend of this zig-zag line goes upward, it means an increase in blood pressure and *vice versa.*

The recording mechanism is somewhat complicated and a detailed description at this point would not be profitable. One of the most satisfactory devices involves a metal bellows similar to that used in recording breathing. However, the ordinary bellows would be so distended when working at 30 or more millimeters pressure that it would not be sensitive to slight additional increments in pressure. It is desirable to keep the bellows quite sensitive. This may be done by enclosing it in a small chamber so arranged that when the cuff-bellows system is inflated, similar pressure is produced in the chamber surrounding the bellows. Thus the bellows is not distended but is in its sensitive position. By turning a valve, the chamber can be isolated so that it remains at the same pressure; and the bellows can now respond to any changes in pressure in the cuff. The changes will be slight, of course, but with the bellows now in its sensitive condition and one end rigid, the other end will move perceptibly to correspond to changes in blood pressure. There is still one difficulty in that the motion of the bellows is now inside the chamber, whereas the polygraph is outside. This can be brought to the outside by having one side of the chamber consist of a very thin sheet of spring steel. A lever system operated by the movable end of the bellows activates a rod which extends through the center of the steel diaphragm and is fastened to it rigidly. The diaphragm is strong enough to withstand the air pressure inside the chamber, but it will warp slightly and serve essentially as a fulcrum for the lever which extends through it. The outer end of this lever makes connections with a barographic pen which writes on the polygraph.

The actual conduct of the examination involves nothing that has not already been discussed in connection with breathing, and in fact the two techniques are almost universally used simultaneously. There are some questions on which the subject is known to tell the truth, and some on which he may or may not lie. Categorical questions are used for the most part to minimize the influence of muscular effort on breathing and blood pressure. If a previous criminal record is available, although the suspect does not realize the fact, he may be asked about one of those crimes and, if he denies any connection with it, it is certain that he is lying. Then it is very significant to note what happens on the polygraph record at that known lie as a standard for comparison with the record for suspected lies. An examiner occasionally sets up such a situation artificially by presenting several playing cards and having the suspect look at one of them. Then the examiner names them in succession and the suspect denies having looked at each one. There will usually be one card for which a more significant record is manifested and this also gives some notion as to what to expect on the record for an actual false statement.

Interpretation. The earlier investigations, which took readings periodically by the ordinary medical technique, showed that rises in blood pressure were diagnostic of falsehood, provided they were of significant magnitude above the initial level. In the continuous technique, again, it is increases in blood pressure that are diagnostic because they reflect emotional tension. Falsehood involves some fear and perhaps traces of anger, and these emotions affect the sympathetic division of the autonomic nervous system in such a way as to increase the blood pressure. A typical record is shown in the lower portion of Section *B* in Figure 11. Each notch in the straight line indicates the asking of a question. It is to be noted that during the first question the blood pressure curve remained essentially level, but on the second question there was an upward trend followed by a subsequent return to normal or even a bit below normal and some further fluctuation. This is a very frequent pattern for a false statement. It should be emphasized that the changes do not occur unless the subject is aware of the fact that he is lying. The technique does not give an objective check on the veracity of the story but merely on the consciousness or awareness of deception. For example, in an experimental situation, a detective stated that he slipped a hacksaw in to a prisoner. The statement was absolutely false, but the record did not show any deception because the detective knew he was kidding and did not have any subjective feeling of falsehood.

Another common pattern is that shown at *A* in Figure 11. With many subjects there is a slight rise in pressure on each question. This may be due to some general factor of alertness or to the mere physical effort of speaking. Usually the rise is brief and slight. It is apparent on the first two questions in *A*. On the third question the rise is a little higher and persists a little longer. These rises may persist from 15 to 25 seconds when the suspect lies. Sometimes the examination involves only one rather crucial item, and the interrogation builds up to that. In that case there may be a gradual rise in blood pressure on successive questions and then a decrease after this crucial question when the tension has been relieved. This is often accompanied by heavier breathing after the crucial question has been answered.

The examiner watches the breathing and the blood pressure curves together because one aspect may affect the other. Holding the breath, for example, has a pronounced effect on the blood pressure. Even breathing deeply may influence the pressure, and, of course, there are momentary pauses when a person draws in his breath in order to speak.

It should be stressed again that variations in the record such as those just mentioned should always be evaluated according to what happens on the control questions. If there is a slight rise on each control question, there must be a more pronounced and longer rise on the crucial question in order to indicate that the subject is lying. It is interesting, if the suspect confesses, to take another record and ask him some of the crucial questions again. He now answers them truthfully and usually shows quite a different picture on the polygraph from that for the false responses to those same questions.

Difficulties and precautions in the techniques. A frequent objection to these techniques is that they are liable to convict innocent persons. The notion is that an excitable suspect who is innocent will nevertheless be under such tension in the examination that his record will appear irregular and suspicious at many points. It is quite true that an excitable suspect may show a lot of ups and downs in his blood pressure and irregularities in his breathing. However, the saving feature is that the individual serves as his own control. There are always many questions on which it is certain that the suspect is telling the truth. These serve as a base or standard for interpreting the crucial questions. It is always a matter of what happens on the crucial questions *relative* to the questions on which the suspect is known to be telling the truth. Anyone is under some tension during this type of examination simply because he is on the carpet and his blood pressure, for example, will be a little higher than normally. But on the crucial questions, if he tells the truth, there is very little additional tension because he has nothing further to worry about. If, however, he is lying, then a certain increment of tension is added to that already existing, and there is a further rise or deviation of some sort. Thus, there is little danger of convicting the innocent if the record is interpreted in this relative fashion. Another point is that the tension caused by being under examination is apt to decrease as the examination progresses. The excitable innocent suspect shows less disturbance toward the end of his record, whereas this is not so apt to be the case with the guilty party. It is advisable, likewise, to conduct the examination in private to avoid undue excitement from the surrounding situation. Sometimes it is difficult to achieve this point, particularly if one takes the apparatus out on a consulting job, because everyone wants to see what is going on. It is advisable, of course, to have an officer in the room to control the suspect if he should suddenly go berserk, and it may be desirable for legal reasons to have some other person present. The audience should be minimized as far as possible and should be inconspicuous. Extraneous influence by persons other than the examiner may introduce serious error. The writer recalls a case in which he was having a little trouble in getting the suspect to stick to categorical, "Yes" and "No" answers. After the examiner had cautioned him two or three times to answer "Yes" or "No," the officer who was sitting at one side, thought that something ought to be done about it, so he came and stood over the suspect and really told him to answer "Yes" or "No." It took ten minutes or so before the record got back to a point where a scientific analysis was possible. It is well to conduct the examination with a rather quiet, moderate voice, without semblance of the grilling that often characterizes police examinations and introduces too much suggestion. It has been found in some instances that the technique was not very successful after the suspect had been through a third degree. Too many suggestions of guilt had been planted so that interpretation was difficult.

A situation which sometimes causes difficulty is when the suspect is guilty of some other offense but innocent of the one for which he is under suspicion. The record may show irregularities even on non-crucial questions because the suspect is worrying about the examiner getting into this other matter and is gradually building up a little tension. This is especially apt to be the case if the suspect does not know how much the examiner knows about the other matter. If the examiner knows everything, it may be advisable to assure the suspect that they are not going to discuss the other crime at all. There are instances when more tension is revealed during the discussion of some former offense than when considering the present one. Such a trend suggests innocence in the present case. There are cases, too, where no specific present offense is under consideration but the examiner is fishing around to see if he can find any topics on which a suspicious character who has been apprehended seems to show some tension.

The question sometimes is raised as to whether the technique is successful with hardened criminals. Many persons can lie glibly without batting an eye. There is empirical evidence that the technique actually can detect persons of that sort. Apparently, one can control such external manifestations of emotion as facial expression but one has less voluntary control over internal mechanisms like blood pressure. In fact, one very successful use of these methods involved a group of men who were taken in a crooked poker game.

The suspect may attempt to beat the test by keeping calm on crucial questions and deliberately producing irregularities on control questions. One reason for applying a lot of devices to the suspect is to forestall just this sort of thing. If he is clever, he may be able to watch a few of his responses carefully and conceivably can circumvent the technique. However, if he has a blood pressure cuff on his left arm, two pneumographs around his chest, the first two fingers of the right hand clamped in a reaction key which he presses at certain stages during the examination, the left hand clamped similarly but supposed to remain immobile, two electrodes with appropriate leads clamped on hand or arm, and has in front of his face a voice key which picks up the sound waves to record the instant at which he speaks, if he is trying to circumvent the procedure he must watch all these things and is apt to become confused. While he is attempting to control one aspect, he will slip up on some other aspect and incriminate himself. Special mention should be made of surreptitious muscular tension. A clever suspect might contrive to influence his blood pressure by pressing the forearm against the table imperceptibly or by tensing the thigh muscles. This possibility has been demonstrated experimentally, and an expert, while telling the truth, has been able to simulate a deception record. Sometimes such tendencies may be detected by watching the suspect carefully. Another possibility is to employ supplementary devices in the way of inflated rubber bladders under the forearms and thighs which record pneumatically on the polygraph. Any undue contraction of these other muscles can thus be observed.[11] Voluntary irregular breathing is of course obvious on the record. In case it is apparent that the suspect is attempting to circumvent the technique it often suffices to call his attention to the fact and tell him that he is thereby creating suspicion.

---

[11] See Reid, J. E., "Simulated Blood Pressure Responses in Lie-Detector Tests and a Method for Their Detection," *Journal of Criminal Law and Criminology*, 1945, 36, 201–214.

Mental abnormality of the suspect may be another source of difficulty. Feeble-minded persons and children are more difficult to diagnose because they cannot distinguish so readily between truth and falsehood and hence, do not experience emotions of deception. Children, moreover, may be upset by the slight discomfort of the blood pressure apparatus. Occasionally a pathological liar is encountered who shows a very erratic record which is difficult to interpret. A religious fanatic suspected of robbery showed an irregular breathing record and fidgeted around so much that he upset the blood pressure record too. Feeble-minded and psychopathic suspects would be detected as such by a good clinician, and an examiner using these methods should have some background in clinical psychology.

Physiological abnormalities sometimes create difficulties in interpretation. Merely having high or low blood pressure is not serious from the standpoint of diagnosis of deception except that it may be difficult technically to secure a good record on a person with extremely low blood pressure. A persistent cough or some allergy with attendant sneezing, makes it impossible to secure a satisfactory record. Cardiac defects occasionally are encountered. The examiner, not being medically trained, does not attempt to diagnose them but should be able to discover that the record is atypical and would then observe extra care in his interpretation or might find it advisable to discard the record altogether. There have been occasions when an examination was conducted a few hours after an offense which involved a lot of attendant emotional disturbance, and an unsatisfactory record resulted presumably because of adrenal exhaustion. Emotional capabilities had been so exhausted by the event itself that the excitement of lying did not add enough tension to be perceptible. A later examination, of course, avoided this difficulty.

Practical use of the techniques. A combination of blood pressure and breathing records is employed widely in practical situations. The first extensive use of continuous records of this sort was made by Larson in the police department at Berkeley, California. Subsequently, various laboratories have engaged in research along these lines and have handled cases on a consulting basis. A considerable number of police organizations are equipped with instruments of this sort although it is difficult to ascertain just how adequately trained are the personnel using them or how rigid is their scientific attitude. The greatest usefulness of the method has been in preliminary examination of suspects with a view to getting clues, delimiting the problem, fastening suspicion on a single individual, and getting specific information that is helpful in clearing up the case by ordinary methods. In many instances the suspect, in the course of the examination, will confess. Where the method is handled scientifically, there is no compulsion on the part of the suspect to take the examination at all. He is told that this instrument will indicate when he is telling the truth, and if he is innocent, as he claims, it will help his case a lot to sit in the apparatus while answering questions. If he demurs, this immediately casts suspicion on him because there is no reason for an innocent person to be afraid of the technique. Almost all suspects, when approached in this way, prefer to go through with the examination rather than incur suspicion by appearing to be afraid of it. It will now be in point to mention a few typical cases which give some notion of the scope of problems which may be approached in this manner.[12]

One type of case is that in which it is desired to eliminate several suspects and narrow the problem down to a single one. For example, some persistent shop-lifting was traced to a rooming house involving a number of girls. They all submitted to examination with the polygraph technique, and only one of them showed any marked tension when questioned regarding the shop-lifting. Subsequently, some of the materials which she had stolen and sold were recovered. It is to be noted that the other girls, some of whom were quite excited about the situation, nevertheless did not incriminate themselves. In another case the manager of an exclusive club gave the valet one of his suits to have it pressed and inadvertently left a lot of money in the pocket. When the suit was returned without the money, the valet explained that he had not taken it to the regular pressing shop in the club but to an outside establishment. This tended to direct suspicion toward the valet. He was then tested on the polygraph, but the record looked clear. Next, the errand boy who carried the suit to the outside pressing establishment was tested in the same way, and his record likewise was clear. Then the owner of the press shop was brought in and showed some tension when asked about the money. The examination continued by asking him about different amounts of money—$600, $650, $700. He showed more disturbance in the record when an amount of money was mentioned corresponding closely to what actually was in the suit. It developed that he was the actual culprit. This elimination of some of the suspects by a brief examination often saves a lot of time. It requires much more effort to run down the alibis of numerous people and check their statements by other procedures. If the wrong person is suspected at first, is brought to trial, and the real culprit is apprehended later, there is a substantial cost for the additional unnecessary trial. It has been estimated that the use of these techniques in the state of Michigan saved about $25,000 in trial costs in one year.[18]

---

[12] For details of many cases and reproductions of excerpts from polygraph records, see Larson, *Lying and Its Detection,* and Inbau, *Lie Detection and Criminal Interrogation.*

Another type of case involves narrowing down the problem within the context of the particular case. A truckload of goods had been stolen and when a suspect was examined, it appeared from his record that the truck was somewhere in Chicago; he showed tension when denying it was in Chicago and less tension when denying it was elsewhere. A map of the city was produced, and he was questioned about different locations within the city and note made of concomitant variations on the polygraph. The location of the truck was finally narrowed down to one or two city blocks. The police carried on from that point and found the truck.

Another possibility is that indications of excitement regarding some crime other than the one for which the suspect is under examination, may tend to clear him in the present instance. A bank clerk was being examined regarding the disappearance of $5,000. When asked if he had taken that money, he replied, "No," and the record showed nothing significant. He was then asked if he had ever taken any money from the bank and he denied it. The record, however, showed tension. Presently, he admitted having taken a few stamps. He denied that he had ever taken anything besides the stamps but again the tracings were suspicious; and later he admitted that he had picked up some loose change from the floor. However, when asked again about the $5,000 his record indicated no tension. The polygraph tended to clear him of the major offense because, if he showed tension when lying about stamps and loose change, he certainly should show it when lying about $5,000. In another instance a murder suspect showed some irregularities in the early part of the record, although there was nothing of significance when discussing the murder itself. It was known that he had been in court previously for indecent exposure. When asked about that he showed very clear disturbances in the record. These tended to indicate that the earlier tension was caused by worry about the previous offenses rather than the murder and suggested his innocence in the latter connection.

The technique sometimes discovers an offense where it actually was unsuspected. A theft of twenty dollars had taken place, and a friend of the family who happened to have been the last person in the house, came in to discuss the case. He was not really under suspicion, but it was suggested as a matter of routine that he be connected with the apparatus while he was discussing the details. In the course of the discussion he was asked if he took the twenty dollars and the record looked suspicious. A few moments later he was asked if he had ever been arrested and he said, "No." Here again the record appeared significant. The examiner managed to stall long enough for someone to go out and consult the files and, sure enough, the man had been arrested on a previous occasion. Thus a portion of the record gave the pattern when he was known to be lying and it was very similar to that involved when he denied taking the twenty dollars. It developed that he actually had taken the money himself. There have been cases where persons in a bank were being examined about a small amount of missing money and before the tests were over, much larger thefts were discovered. In one instance the sum involved in the initial investigation was only a few dollars, but eventually the examiner found $4,500 which had been taken but not yet missed.

---

[18] Keeler, L., "The Lie-Detector Proves Its Usefulness," *Public Management*, June, 1940, pages 163–166.

Sometimes it is profitable to use this technique in "fishing" for information about offenses. For example, an elderly man was picked up for begging near a church. When he reached headquarters some of the staff recognized him as a man with a record and many aliases who had not been in town recently. They wondered what he was up to now and attempted to find out. He was asked questions about forgery, robbery, and burglary. The polygraph showed little tension when discussing forgery or robbery, but burglary did apparently cause some disturbance. Then the files were searched for recent unsolved burglaries, and the suspect was questioned regarding them. With all but one the record seemed perfectly clear, but on this one there were evidences of deception. From this point on, the police followed their usual procedures, and eventually the individual was proved guilty.

Over-all success. The technique is not perfect by any means. In many instances no final check on accuracy is available. It is concluded that the suspect is guilty, but there is no subsequent confession or no conviction on the basis of other evidence. Similarly, the suspect may be cleared by the polygraph record but the actual criminal is not apprehended. Thus, it cannot be determined with certainty whether the technique worked or not. The cases in which there is known outright failure, however, are limited. In the Northwestern Crime Detection Laboratory, for example, over a three-year period with something over 2,000 cases, only twelve mistakes actually were verified.[14] One authority on the basis of twelve years' experience in two laboratories devoted to this work states that the accuracy was about 70 per cent. About 20 per cent of the cases were equivocal, and about 10 per cent involved actual error.[15] The above is a fairly conservative estimate as to the over-all effectiveness of the method. It should be borne in mind that 50 per cent success would be expected by accident. With the amount of error indicated here, one should be cautious in making a decision on the basis of polygraph results alone. However, the technique so frequently gives some clues and information that can be followed up in other ways that it does simplify the problem and expedite the solution. The usefulness of these techniques is not confined entirely to criminal investigation. They have been used sometimes in screening applicants for employment or even in evaluating present employees. Bonding companies, on occasion, have bank and retail store employees or applicants examined and questioned about their financial irregularities. If a prospective employee denies any questionable financial activities, but the polygraph record shows otherwise, he is less apt to be hired than is a man who admits some irregularities while the record indicates that he is telling the truth. The notion is that the concern now knows about his past and he knows that they know, so he will be likely to go straight. In one drug store chain the irregularities were reduced from 76 to 3 per cent of the employees. The examination obviously had a deterrent effect.[16]

---

[14] Trovillo, P., "A History of Lie Detection," *Journal of Criminal Law and Criminology,* 1939, 29, 877.

Electrodermal Responses

Technique. Some other techniques which are used less frequently should be mentioned. One of these records changes in the electrical resistance of the skin during emotional conditions. Two electrodes are placed on the skin, and the conductivity of the region between them is measured. They may be on two parts of the hand such as back and palm or even on two parts of the same finger. A slight voltage, such as that from a single dry cell, is applied across these electrodes and then the current is balanced so that it operates a galvanometer. This latter has a small mirror which swings as varying amounts of current pass through its coil, and a beam of light reflected from the mirror is photographed. The polygraph tape must consist of sensitized paper, and the other variables also must be recorded photographically. It is also possible to use a photoelectric recorder and a pen which writes with ink on the usual paper tape.

---

[15] Inbau, *Lie Detection and Criminal Interrogation.*

[16] Keeler, "The Lie-Detector Proves Its Usefulness."

Interpretation. The graphic record is a function of changes in skin resistance. Various characteristics of the record may be significant. One is the actual magnitude of the deflection. A considerable change in resistance suggests a greater emotional disturbance. If the record before a question is essentially horizontal, that line may be projected as a base. Then, when the question is asked, if the line deviates from the base and returns to it, the area between the base-line and the tracing may be noted. A larger area for crucial questions may be significant. Another possibility is a sudden deflection of the line as contrasted with the usual gradual change. Then again, any unusual patterns may be of significance. Inspection of the entire record will indicate the typical pattern for that subject on control questions, and pronounced deviations from this pattern on crucial questions are suspicious.

Success of the method. The electrodermal response thus far has not proved as successful as the blood pressure-breathing technique. One researcher says that it is, "not as consistent in actual case work." [17] Another states that, "blood pressure and respiration tracings are far more valuable for detecting deception in actual cases than is the tracing of the electrodermal response." [18] There are indications that the electrodermal is a little better in experimental laboratory situations than in actual criminal practice. It is possible that it is sensitive to the general alertness and mental activity involved in the laboratory experiment. Darrow has pointed out that perspiration of the palm, for example, helps in maintaining grip, and in cases where alertness is needed, this might go with a higher level of attention and mobilization of energy for an adaptive response. He has shown further that the blood pressure seems to be more sensitive to emotions of an ideational origin, whereas the electrodermal responds more to emotions resulting from sensory stimuli such as a loud sound. His notion is that although emotions of the former type are not strictly cortical, there is a conflicting excitation there which interferes with the ordinary inhibitory action of the cortex and releases the subcortical emotional pattern.[19] It may be that as more experimental work is done with the electrodermal response, its usefulness will be increased. At present it appears to be somewhat inferior to the other techniques, but, of course, may be useful in supplementing them.

---

[17] Trovillo, P., "A History of Lie Detection," *Journal of Criminal Law and Criminology,* 1939, 30, 110.

[18] Inbau, *Lie Detection and Criminal Interrogation,* page 51.

[19] Darrow, C. W., "Emotion as Relative Functional Decortication; the Role of Conflict," *Psychological Review,* 1935, 42, 566–578.

Other Techniques

It is well to mention in passing a few other techniques which are still in the experimental stage. It is suspected, for instance, that involuntary movement of some of the larger muscles may be diagnostic. A cue is taken on this point from procedures bordering on the occult—muscle reading, which is employed to "read minds." It involves grasping a person by the wrist or hand and asking him questions of a personal nature. The operator has delicate tactual sensitivity and is able to detect slight involuntary movements on the part of the client. By following up clues on which the client seems to react, in the familiar hot and cold fashion, it may be possible to reveal startling things about the individual. The point in the present connection is that when something hot is mentioned, the subject responds by a little involuntary movement of the arms or fingers. It is entirely possible that if such involuntary movements were recorded graphically during examination, they might be significant. There is a device of this type, called a planchette, a light platform suspended by wires from the ceiling, which moves with practically no friction. A light pencil records on a sheet of paper underneath, and the forearm rests on the platform. It has been shown that if a subject sits quietly, and somebody mentions an object that is at his right, a slight involuntary movement in that direction will be made. As far as the writer knows, this technique has not been used specifically with reference to crime detection problems, but it might be worth investigating.

A preliminary investigation was made of a technique in which the subject simply tapped automatically with the first and second fingers. He followed the beat of a metronome and after a slight amount of practice was able to continue this tapping automatically while he was answering questions. The fingers were clamped to the tapping key, much after the fashion of the Luria technique (page 330), so that a continuous record of the finger motion was made on the moving tape. The tapping yielded a wavy line, and the characteristics of this line were noted during crucial questions in comparison with control questions. Some characteristics that appeared diagnostic were the total length of the tracing for a given period of time, the tendency for the line to be sharply pointed at the ends or more rounded, and general irregularities.[20]

An investigation was made of the ability to maintain ocular fixation during deception. The position of the eye was recorded by the conventional technique of reflecting a beam of light from the eyeball to a moving film, and the subject maintained fixation while answering questions by moving his finger. Five judges looked over the records and evaluated them according to whether there was increase or decrease in ocular movement on any given question. It appeared that a decrease in such movement was somewhat diagnostic of guilt. Under laboratory conditions, the diagnosis was correct about 80 per cent of the time. However, for practical purposes, the use of several experts to go over each record would be prohibitive.[21]

---

[20] Berrien, F. K., *A Study of Finger Movements as Indicators of Deception.* Ph.D. Dissertation, Ohio State University, 1938.

Still another technique recorded the diameter of the pupil of the eye during examination. This necessitated keeping the head of the suspect rigid, watching the eye through a telescope, and keeping the hair-line of the telescope just at the edge of the pupil, while an attachment to the telescope wrote on a moving tape. There were indications that a steady dilation of a few seconds' duration followed by a more rapid constriction was typical of deception. Here again, the restriction of the subject's movement would make it difficult to use this technique in actual criminal investigation.[22]

Misuse of Techniques

There is a real danger that techniques such as those described may be used by persons who are scientifically incompetent. The success of the methods in the hands of experts may lead a police department or other agency to assume uncritically that anybody is competent to use these methods and that the technique itself is foolproof. This is far from the case, and there probably have been many instances of injustice due to improperly qualified persons using these devices. The operator needs, first of all, a thoroughgoing scientific attitude which includes plenty of patience, attention to detail, and conservatism in drawing conclusions. He also needs some laboratory training, not only so that he can adjust the apparatus but also so that he will be alert to the importance of extraneous variables in a situation where an examination is being conducted. He ought to be familiar enough with clinical psychology to know about the dangers of suggestion in the conduct of an examination and to be able to recognize pathological types. He should, of course, be thoroughly familiar with the actual techniques involved from an experimental standpoint and be aware of the way that factors other than the examination may influence the blood pressure or the breathing. Finally, his underlying philosophy should be that of getting the facts rather than that of getting a conviction. Law enforcement people, unfortunately, have the latter objective many times when they should be looking toward the former.

---

[21] Berrien, F. K., "Ocular Stability in Deception," *Journal of Applied Psychology,* 1942, 26, 56–63.

[22] Berrien, F. K. and Huntington, G. H., "An Exploratory Study of Pupil Dilation Response During Deception," *Journal of Experimental Psychology,* 1943, 32, 443–451.

The foregoing caution applies to persons using the technique who really are sincere about it and attempting to use it scientifically but inexpertly. There are, however, those who unscrupulously use the techniques to extort a confession. The writer suspects that in some instances these methods have been used essentially as another type of third degree. The person is connected to the apparatus, and the questions asked. Then he is told that the apparatus shows that he is guilty and that he might as well come clean. A district attorney observing an examination for the first time, remarked that almost anyone would confess under these circumstances. Evidently that was the aspect which impressed him. To be sure, a suspect often does confess in the course of the examination. It is common practice, if the record looks very clearly guilty, to call his attention to that fact, and, without any undue suggestion, ask him if he can explain why the record should show disturbance at certain points. This ostensibly gives him the opportunity to mention extenuating circumstances, but many suspects give up at that point. However, it should be noted that a procedure of this sort is not followed by a real scientist unless he is fairly sure from the record that the subject was deceiving him. Taking an equivocal record, falsely stating that it looks suspicious, and then putting on the pressure is utterly indefensible from the scientific standpoint. This all adds up to the fact that the person who is going to use these techniques should have had scientific training and above all, should have a scientific attitude toward the project. Instrument makers should be very discreet in selling apparatus of this sort unless they know how it is going to be used and who is going to use it.

Legal Status of Psychological Crime Detection Techniques

Naturally, there have been efforts to introduce results of examinations with the techniques just described in actual trials. If the defendant has been examined by an expert who concludes that he is innocent, defense counsel may attempt to present the testimony of this expert as part of the evidence. Such evidence has not been admitted thus far except under very special circumstances. This is as it should be. For one thing, evidence of this type is almost too inclusive. Most kinds of evidence cover only limited aspects of the case such as the existence of poison in a body, whereas other evidence indicates how the poison got there. The techniques under discussion cover the whole thing in one fell swoop and allege guilt or innocence, thus making the correctness of the decision extremely important. The techniques are not 100 per cent correct anyway. There are no adequate qualifications as to just what constitutes an expert. Furthermore there is inadequate opportunity for the court or the jury to observe the data on the basis of which the expert made his judgment. A handwriting expert can present the specimen and show just what features were given weight in his judgment, but the interpretation of a polygraph record is too complicated to explain to the jury. Thus, it is to be expected that the courts should be conservative in admitting expert testimony of this sort. The precedent which is usually cited and which has carried a great deal of weight hitherto, dealt with the defendant in a murder case who had confessed but later repudiated the confession, and then was examined by an expert who concluded on the basis of blood pressure and other criteria that he was innocent. The court refused to admit the expert testimony.[23] More recently, in 1938, the examination by an expert along these lines was admitted.[24] The defendant was charged with robbery and the court, over objections by counsel for the prosecution, admitted the testimony of an expert who had examined the defendant with some of these techniques and asserted that he was innocent. In another case, however, the defendant requested the court's permission to be tested by this same expert, the request was denied, and the Appellate Court sustained this denial.[25] These latter cases suggest that the matter is becoming somewhat marginal and that perhaps eventually such testimony will be admitted with greater frequency. The psychologists are not very enthusiastic about this possibility anyway. A Wisconsin case, however, introduces an interesting feature. This involved a party of four, one of whom shot a sheriff while attempting to escape from the scene of a robbery. Counsel on both sides agreed to have the suspects examined by experts from the Laboratory at Northwestern University and to waive any objections as to the admissibility of the evidence. It is to be noted that both parties agreed in advance to have the examination conducted. It was not a question of someone having the examination conducted, and then, if it were favorable, attempting to introduce the expert testimony, but rather putting all the cards on the table in advance. This is the procedure any scientist would recommend. The experts in the case did examine the suspects, and the results were clear to them. One man (designated by *L*) showed no particular tension when asked if he did the shooting but did show some when asked if he drove the car. Another man (*G*) showed tension regarding the crime itself but not regarding driving the car. He did, however, show excitement when he denied that *L* drove the car, and similarly *L* showed excitement when he denied that *G* did the shooting. The expert presented these results in the trial, and when questioned by the court indicated that he would not decide the whole case on this basis but considered it an important element. The court charged the jury to give the evidence "such corroboratory weight and effect as you think it entirely reasonable for it to receive." Both men were judged guilty of assault regardless of human life and sentenced to eight years and there was no appeal.[26] This impartial introduction of the expert has much to recommend it. However, the psychologist's methods probably will be most useful in the preliminary investigation of suspects and in running down clues.

---

[23] *Frye vs. United States,* 293 Fed. 1013 (D.C. 1923).

[24] *People vs. Kenny,* 167 misc. 51, 3 N.Y. Supp. (2d) 348 (1938).

[25] *People vs. Forte,* 167 misc. 868, 4 N.Y. Supp. (2d) 913; 279 N.Y. 204; 18 N.E. (2d) 31 (1938).

A question is sometimes raised as to the admissibility of a confession made by a suspect after having undergone an examination of this sort. Scientifically, it all depends on whether the confession resulted without any undue suggestion and pressure being brought to bear upon the individual, or whether it might have been a false confession because of such factors. Legally, such confessions have been admitted. For instance, a man confessed to a murder after a test of this sort and since there were "no promises, force or threats," the mere use of the instrument did not render the confession inadmissible. The examiner who heard the confession was presented and it was not necessary even to mention the polygraph at all.[27]

Thus, the techniques for scientific crime detection developed by the psychologist have come a long way. They are not perfect by any means but in proper scientific hands may be very useful in unraveling some of the details of a case. It should be emphasized again, however, that these techniques in the hands of untrained or unscrupulous people are fraught with serious contributions to injustice.

Summary

Various psychological techniques are available for scientific crime detection. In actual practice, several of these are employed simultaneously. The association-reaction technique involves the presentation of stimulus words to which the subject responds with the first associated word. Some stimuli deal with the crime and others are control words. The time between the presentation of the word and the suspect's response is recorded in hundreds of a second by appropriate techniques. Retardation of this reaction time on a crucial word may result from emotional blocking or from deliberate suppression when the first word which occurs to the suspect would be incriminating. Analysis of the difference in average reaction time for the two kinds of words and also of the difference in variability for the two types may be diagnostic. Also, the actual nature of the response may indicate familiarity with the crime. A very essential feature of the technique is the selection of crucial words which are actually crucial in the sense that to the innocent person they would not be associated at all with the crime, but would suggest the crime to the guilty person. An interesting supplement to the association-reaction method involves a manual response key which the subject presses simultaneously with his oral response. This key records pneumatically and continuously the position of the finger which is clamped to it. A record of this manual response can be aligned on a moving tape with an electromagnetic pen recording the time of presentation of stimulus and of oral response, so that the two aspects may be compared. Sometimes there is a premature manual response prior to the actual oral response. In other instances the examiner surveys the entire record, gets a notion of the general pattern of response for the given individual, watches for significant deviations from that pattern, and notes if these deviations occur mainly for crucial words. The association-reaction method has been used quite frequently in cases that did not come to the attention of the police. After an offense has received considerable publicity, it is difficult to secure crucial words.

---

[26] Inbau, F. E., "Detection of Deception Technique Admitted as Evidence," *Journal of Criminal Law and Criminology,* 1935, 26, 262–270.

[27] *Commonwealth vs. Hipple,* 333 Pa. 33, 3 Atl. (2d) 353 (1939).

A continuous record of breathing during examination on an alleged crime may be obtained by appropriate apparatus strapped around the chest and operating pneumatically to make a tracing on a moving tape. It is well to confine the questions largely to those which can be answered categorically so as to minimize speaking, which produces changes in the breathing and makes interpretation difficult. Some control questions are asked on which it is certain that the suspect will tell the truth, and then when he is asked critical questions, the record can be scrutinized for significant deviations from the control portion. The questioning should be carried out in a neutral fashion without suggesting that the suspect is guilty. In most instances the breathing record is interpreted qualitatively, noting differences between the record for the two types of questions. Diagnostic characteristics include general irregularities or suppression of the breathing while telling a falsehood and, sometimes, deeper breathing a little after the false responses, possibly as a result of relief. Another possible type of analysis is to consider the inspiration-expiration ratio for each breath. The subject is instructed to remain silent after a question is asked until he is given a signal to respond. In this way several breaths are recorded before and after his answer. The inspiration-expiration ratio for the breaths following compared with those preceding the answer is diagnostic. If the ratio is greater after the response than before, the hypothesis is that the response was false and *vice versa.* Interpretation of the breathing, along with other criteria such as blood pressure, has shown a reasonable degree of success in actual practice.

Blood pressure is probably the most successful of the crime detection techniques. In the early work, readings were taken periodically in ordinary medical fashion, but this was inadequate because significant emotional disturbances occurred between readings. Subsequently, a method of continuous recording on a moving tape was developed. This involves the usual rubber cuff around the upper arm and a pneumatic step-down device so that a small metal bellows records on the tape. The conduct of the examination is similar to that described in connection with breathing —namely, control questions on which the subject will be certain to tell the truth and crucial questions. Talking is minimized by using questions which can be answered categorically. A gradual rise in blood pressure at a critical portion of the examination may be symptomatic. Many subjects have a short rise in blood pressure when answering each question, but when the answer is false the rise is a little greater and a little longer.

It is often suggested that these techniques will convict innocent suspects. This danger is remote because the individual is used as his own control, and responses to critical questions are interpreted compared to responses of the same person to control questions. It is well to conduct the examination under essentially laboratory conditions without an audience. Difficulties sometimes arise because the suspect is guilty of some other offense and worries about that while he is being examined.

The technique seems successful even with hardened criminals. There is a possibility of a clever suspect circumventing the technique by attempting to remain calm on non-crucial questions and perhaps introducing imperceptible muscular contractions on control questions. The former aspect can be circumvented somewhat by attaching a great many devices to the subject so that he has just too many to watch. The latter may be detected by supplementary devices placed under the forearms or thighs to record pneumatically any muscle contraction in those members.

One of the most useful fields for these devices is in the elimination from a group of suspects of those who are clearly innocent. Similarly, the problem may be narrowed down to certain details or even to a certain region by discussing different details or regions and noting the subject's responses. Sometimes, the suspect has been involved in some other type of misbehavior which can be discovered during the examination. If he is merely a suspicious character, it is possible to use a fishing approach and ascertain if he has been up to something.

Another technique that is less successful is the electrodermal response —changes in the electrical resistance of the skin. The technique involves two electrodes, a small applied voltage, and a complicated circuit which ends in a recording galvanometer. The amount of deflection of the curve or the rate of change is sometimes diagnostic. It appears that the electrodermal response is more sensitive to emotion arising from some such sensory situation as a startle than from an ideational situation such as deception. Blood pressure is more sensitive to the latter.

There is real danger that untrained or unscrupulous persons may misuse the technique and either make serious mistakes or deliberately force an incorrect confession. The legal status of the method is still uncertain. The best procedure seems to be to have both parties agree in advance to waive any question of admissibility of the evidence, and then have the expert conduct the examination and testify regarding his findings.

14

PSYCHOLOGICAL FACTORS IN CRIME

Now that we have considered psychological problems in connection with testimony and crime detection, we turn to the criminal himself. The keynote of the present-day scientific attitude toward criminals is individualization; effort is made to discover what factors in the individual case led to the crime. In disposal of the case, again, the punishment or the ameliorative program is individualized.

This modern attitude toward criminals is quite at variance with classical criminology. In earlier times it was merely a matter of what crime had been committed rather than who committed it. All horse thieves were equally culpable and received the same treatment. This simplified the administration of justice for it was merely necessary to establish guilt—further disposal of the case was routine. The procedure entirely overlooked such possible contributory factors as feeble-mindedness, emotional unstability, or extreme economic pressure.

Modifications in this point of view began with the work of some Italian penologists in the middle of the nineteenth century who approached criminals from an anthropological standpoint, with the hypothesis that the criminal was a primitive type. An ape, for example, has a receding forehead so search was made for receding foreheads in criminals. Elaborate anthropological studies of bodily measurements were conducted, and, among other things, it was concluded that the criminal was an atavistic type. These penologists went much too far but they did make a real contribution: they called attention to the criminal as an individual. This paved the way for a psychological study of such individuals as soon as adequate techniques were available. The problem was, and still is, to determine whether there are certain types of persons who are more likely to commit crimes or, in the statistical sense, are predisposed. Mentally disordered and mentally defective individuals are of particular interest to the psychologist in this connection.

Mentally Disordered Criminals

General problem. Mental disorders range all the way from serious psychoses like schizophrenia, through the psychoneuroses to the slight mental maladjustments which can be straightened out by a little mental hygiene. Looking at these mental disorders, it is obvious that some of them have characteristics which might easily cause trouble. General emotional instability or delusions of persecution, for example, may well lead to antisocial behavior. Delinquency is frequently just one of the symptoms of mental disorder.

As indicated earlier, diagnosis of mental disorder is a task for an expert and such an expert is retained in many legal situations. Mental disorder frequently is a mitigating factor in a trial, and, unfortunately, there often results a battle of experts, in which the defense presents an expert who testifies that the defendant is insane, and the prosecution has an expert who alleges that he is normal. This difficulty is aggravated by the fact that the expert is retained by one side or the other, instead of being impartial. Some states have a commendable arrangement whereby persons who are accused of major offenses are immediately turned over to the state department of mental diseases or some similar agency for observation and examination prior to any legal action at all. If this impartial body concludes that the defendant is insane, the whole legal procedure from that point on is greatly simplified and the cost reduced. If, on the other hand, the conclusion is that the defendant is normal, there is not much point in the defense attempting to prove otherwise. An expert can always function more effectively in an impartial capacity. We will now review some disorders which may contribute to crime.

Schizophrenia frequently involves, among other symptoms, delusions of persecution. If a patient has such delusions, he may fear for his own life and eventually take matters into his own hands in an effort to rid himself of the threat. Psychologists often get letters from persons of this sort. For example, the writer received one describing a new persecutory technique which attacked people by telepathy. It apparently was a remote control hypnotic procedure. The correspondent claimed he was being killed by this procedure and was seeking some psychological technique to detect these telepathy currents. He had already contacted the office of the district attorney and had secured no help, but was still looking for a way to save his own life. A person of this sort is liable to take desperate measures if he "discovers" the persecutor. One such man recognized one of his imaginary persecutors and shot him in a crowded railroad station. Another man, whose delusions were to the effect that one of his neighbors was persecuting him by telepathy, corrected the matter by putting explosives in the neighbor's stove.

Another characteristic of the schizophrenic is general instability. Any slight stimulus is liable to touch off violent behavior. A young schizophrenic killed the manager of a theater in the process of robbing the box office. He had expected to find a girl on duty and his surprise at seeing a man in the office was enough to upset his unstable mental organization so that he pulled the trigger. He had a criminal record prior to this event but had never had a mental examination.

A tricky thing about these delusions is that sometimes the patient will have enough insight into the total situation to deny the delusions. A school teacher, for example, accused a neighbor of trying to poison her, a colleague of tampering with her class records, and had other delusions as well. However, when the school board asked her to resign, she denied all these delusions at a public hearing. Evidently, she had enough insight to realize that admitting them would handicap her case. However, they were real enough to her most of the time and might well lead to antisocial behavior.

Paresis. Delusions of grandeur, which often go with paresis, may lead to delinquency. The individual believes that he is very wealthy and then writes checks on his imaginary bank account. He may also have delusions of persecution with resulting crimes somewhat like the schizophrenic's. Paretics may also make sexual assaults, sometimes having the delusion that they are irresistible to persons of the opposite sex without much insight into the implications of their behavior. A paretic in court may lay it down to the judge and tell the court that they should appreciate the fact that he came in there at all.

Manic depressive insanity. The principle source of trouble in the manic depressive psychosis is found in the manic phase which is often characterized by a quarrelsome attitude. In this phase the individual gets into fights and may commit serious assault. He may destroy property wantonly. The situation is critical because this type of violent behavior may appear unexpectedly.

Melancholia. The most common offense of the melancholic is suicide, which, in itself, is not much of a crime, but, however, the victims frequently take others along with them. A typical instance is the melancholic mother who kills the children and then herself.

Senile dementia. Persons with senile dementia commit a good deal of petty larceny and make a general nuisance of themselves. Sometimes, this psychosis is coupled with vagrancy; an elderly person takes to the road and keeps himself going by petty thievery. There may be sex offenses of a minor character executed in impulsive fashion.

Epilepsy. Quite serious crimes of violence sometimes take place during an epileptic seizure, and the patient has complete amnesia about what he did. He may murder his best friend and then, when he comes out of the seizure, wonder who did it. One epileptic in a seizure killed his own mother; another hired an automobile and driver and after being driven around town aimlessly for a while, killed the driver with a piece of gas-pipe, robbed him, and then parked the car in front of his own home. He came out of the seizure standing looking curiously at the car with no recollection of having committed the crime at all. Sex crimes such as attacking children are frequent. A dangerous feature of epilepsy is that the attack may come on without any observable warning. There are some research indications that certain patterns of brain waves make it possible to predict the onset of an attack, but the technique requires elaborate instruments, so that this possibility is of little practical value.

Sex perversion. Sadism is a perversion in which the individual derives satisfaction from inflicting cruelty. It may range from throwing dirt or ink on a person up to the most gruesome type of murder. One case showed great interest in blood all through childhood, hung around when poultry was being killed, and frequented slaughter houses. Finally he murdered a girl, cut the body into seven pieces and showed no particular caution about the crime, leaving the implements lying around where anyone could find them. A man who poisoned a number of victims derived a "funny sort of satisfaction" from observing their behavior. Another man was apprehended who had committed thirty sadistic murders in a period of thirty years. The neighbors regarded him as a harmless, eccentric recluse who was very fond of meat and who had at one time worked as a butcher's helper. Even other inmates of the house where he lived had no suspicions. However, in his room were found tubs of cooked and pickled portions of his victims and a collection of bones. He also had shoe-laces, belts, and suspenders made out of human skin.[1] One characteristic of the sadistic offender is that he is likely to repeat the offense because of the all-compelling urge. The prognosis is distinctly unfavorable.

Fetishism is a less serious form of perversion. Some kind of object becomes more or less of a symbol, and satisfaction is derived from possession of that object. It is somewhat analogous to the way that the normal person keeps souvenirs associated with a pleasant event—a dance program, a pressed leaf, or the remnants of a corsage. To the fetishist, however, the object takes on a more compelling symbolism. The fetish may be a part of the body—for example, hair so that the individual will sit behind a long-haired person in the movies in order to snip off a lock—or it may be an article of clothing—one man collected 446 women's handkerchiefs, and another specialized in lingerie (incidentally, his symptoms were much relieved when he secured a job as a clerk in a lingerie department). Another case went for women's slippers, and the "slipper bandit" accosted women politely, tipped his hat, excused himself, seized a slipper, and made off with it. Still another fetishist concentrated on women's spectacles: he snatched them from women and subsequently burned them or put them on the car tracks and watched the wheels grind them up. Women with glasses attracted him but if they were indifferent, he became excited and relieved the tension by taking their glasses.[2]

---

[1] Polke, "Der Massenmorder Denke," *Archiv für Kriminal Anthropologie,* 1934, 95, 8–30.

Mental complexes. Few crimes are directly traceable to psychoneurotic tendencies as such, but the lesser mental maladjustments and complexes contribute to quite a number of crimes. Delinquency may be a compensation for maladjustment. Kleptomania, for example, is quite frequently a means of releasing tensions, and mental conflicts are found in the etiology of kleptomania. A young woman had been brought up largely by her father and humored by him to an excessive degree so that she had become accustomed to having a man wait on her every whim. Finally she broke away from the home-tie and, after a brief acquaintance, eloped with a young man. She expected him to carry on as her father did and to gratify her every whim, maintaining somewhat of a platonic relationship withal. He could not see it that way, and there was obvious conflict. Later, when she wanted to adopt a child, he objected. Finally, her dog died, and at that time she began shoplifting. It provided her an outlet for her repressions: she wanted to have her own way but could not do so and she compensated by defying authority through stealing. At a later time, she secured a position as secretary to an elderly man who somewhat resembled her father and she did no shoplifting during that period. When she gave up that position, however, the difficulty returned.

Another woman had had a traumatic emotional experience, including an assault, in her early life, with considerable resulting conflict and remorse. Finally, she joined a mission after having attended four religious services in one day culminating in some sort of trance in which she had eight visions and was "at one with God." This feeling grew upon her but later she lost this feeling of sympathy and became obsessed with her old sense of guilt. She began stealing as an outlet for this situation. About the worst thing she could think of was to commit some legal offense and try to win back God's sympathy, much as a child plays suicide in order to get its parents' sympathy. She was attempting thus to reinstate this feeling of at-oneness which she had previously enjoyed. Thus, some delinquency can be traced to these relatively minor conflicts. The offender himself is not aware of the actual mechanism involved. He "just loves gloves," or "thrills to watch a fire burn," and sets up situations which will provide this sort of satisfaction. Back of that, however, is the fact that the behavior relieves tension produced by some mental conflict.

---

[2] Meisner, F., "Der Brillenrauber," *Kriminalistik*, 1939, 13, 223–224.

Some general evidence may be cited on the role of mental conflict in delinquency. An elaborate study in England[3] included a careful psychiatric and psychological examination of a group of delinquent children and of a paired group of non-delinquent children. The control group was selected so that for each delinquent there was a non-delinquent living in the same neighborhood under the same general conditions; therefore, the environmental factors might be considered relatively constant in the two groups. These groups were compared in many respects but the aspect that is pertinent to the present discussion is an analysis on the basis of complexes—suppressed emotional conditions, usually involving some frustration or blocking. In this particular study 18 per cent of the non-delinquents manifested complexes as judged by the psychologist or psychiatrist, whereas 57 per cent of the delinquents had them. Healy and Bronner in their extensive studies of delinquents find numerous cases where there was some disturbance of satisfactory relationships in the family situation. Such investigations tend to corroborate the general role of mental conflict in delinquency.

Magnitude of the problem. It is difficult to secure an adequate over-all impression as to the actual severity of the problem of the mentally disordered delinquent. With various samples of delinquents for which data are available on mental status, there is a wide variation in practice as to what is actually considered pathological. Furthermore, mental disorders differ so markedly in seriousness that any lumping together of the entire gamut is questionable. A few typical studies will be cited at least to indicate the trend. In Massachusetts where the law provides for the psychiatric examination of certain more serious offenders (Briggs' Law), about 15 per cent of those examined each year were declared abnormal.[4] This sample was selected, however, on the basis of serious offenses where fewer of the casual type of criminals and more of those with some deep-seated cause might be expected. Of 10,000 prisoners studied by the psychiatric clinics of the Court of General Sessions, New York City, 18 per cent were rated as mentally abnormal: this group breaks down into 2 per cent feeble-minded, 2 per cent psychotic, 7 per cent psychoneurotic, and 7 per cent psychopathic personalities. Of the 82 per cent normal only 21 per cent were considered well-adjusted, and the rest were aggressive, antisocial, emotionally unstable, egocentric, or shiftless.[5] It is to be noted that some of these people had been referred to the clinic because a mental difficulty was suspected. Nevertheless, in this particular sample there were 1,800 delinquents who were mentally abnormal, and, regardless of percentage, that absolute number of mentally disordered criminals means something. There are numerous instances of an obvious connection between mental disorder and crime, and although statistics vary greatly with the criteria used in selecting the sample, it is apparent that mental disorder is a significant variable to be considered in connection with any program of crime control and prevention.

---

[3] Burt, C., *The Young Delinquent,* pages 540 ff. New York: D. Appleton, 1925.

[4] Overholser, W., "The Briggs' Law of Massachusetts; A Review and an Appraisal," *Journal of Criminal Law and Criminology,* 1934–35, 25, 859–883.

Personality Deviations

General emotionality. There are some characteristics which can scarcely be classified as mental disorder but do represent a significant deviation from normal. These characteristics lie in the general field of personality, and many of them involve deviations in emotional or instinctive processes. Some delinquents are characterized by a general emotionality and overdevelopment of their instinctive adjustments. Evidence of this point was brought out in the study [6] of samples of delinquent children paired with a control group on the basis of environmental factors. The groups were examined carefully by means of interviews and psychometric procedures, and the frequency of various characteristics noted. For the present purpose, it will suffice to consider merely the ratio of the incidence of a particular feature in the delinquent group to its incidence in the control group. Mental defect, for example, had a ratio of about 2.5, that is, it occurred about two and one half times as frequently in the delinquent group as in the non-delinquent group. With reference to personality, however, the ratio for emotional difficulties which the authors call, "disorders of specific instincts," was 4.9, that is, it occurred almost five times as frequently in the delinquent group. Furthermore, for "general emotionality," the ratio was 4.1. Similarly, temperamental deficiencies had a ratio of 10.0 and temperamental instability 3.8.

---

[5] Bromberg, W. N. and Thompson, C. B., "Relation of Psychosis, Mental Defect and Personality Type to Crime," *Journal of Criminal Law and Criminology*, 1937, 28, 70--89.

[6] Burt, C., *The Young Delinquent*, pages 51, 407.

Another approach to this same problem was made by a neurotic inventory—a psychometric device in which the subjects check a list of fears, worries, and the like. The study involved 138 people in three different institutions for delinquents in North Carolina. The gross score obtained was an index of emotional instability. For this group the average score was 66, whereas for Freshmen at the University of Chicago it was 44. Even with some allowance for unreliability of inventories which require the subject to evaluate himself (page 203), these delinquents showed appreciably greater emotional instability than normal as indicated by the tests.[7]

Personality tests. It is worth while to cite a few studies in which general personality tests were applied to delinquent groups. One such test of the inventory type was given to some delinquent groups, each member of which was paired with a normal person of the same age. Comparing an industrial-school group with high-school students of about the same age, the former sample showed more introversion, less stability, and less self-confidence. A reformatory group in comparison with college students, was a little more extroverted. A penitentiary sample showed less self-sufficiency than was manifested in general adult norms.[8] The results do not appear convincing enough to make a prediction of delinquency on the basis of the personality test but they at least suggest a trend.

Another study involved a more extensive series of tests, many of which were not the inventory type. They were given to fifty girls in a trade training school for delinquents and to fifty girls in the public schools who were paired for intelligence with the delinquent sample.[9] For each test the difference between average scores was noted together with its statistical significance (page 93). In this instance the critical ratio involved the probable error rather than the standard deviation, which merely means that a ratio of about 4 (rather than 3) is necessary before the difference is considered significant. The results are recorded in terms of the magnitude of these critical ratios. The largest ratio was 11.7 for a test of suggestibility. The next most significant difference (critical ratio 8.8) was for a questionnaire designed to reveal psychopathic tendencies. Next was a test of overstatement, which had a critical ratio of 5.0. Another test with almost the same significance dealt with social attitudes and involved inquiries about feelings on such things as the police or joy-rides. Preference for male companions (tested by selecting from at least three biographies the one which the subject would like for a companion) yielded a ratio of 4.2. The remaining tests showed smaller differences. Some of these tests are objective in the sense that they do not depend on the subject's frankness in reporting how he feels about various items and hence are superior to the inventory variety. This investigation yields clear evidence of personality deviations on the part of the delinquent group.

---

[7] Garrison, K. C., "A Study of the Emotional Characteristics of Women Prisoners," *Journal of Social Psychology,* 1932, 3, 472–477.

[8] Horsch, A. C. and Davis, R. A., "Personality Traits of Juvenile Delinquents and Adult Criminals," *Journal of Social Psychology,* 1938, 9, 57–65.

[9] Cushing, H. H. and Ruch, F. L., "An Investigation of Character Traits of Delinquent Girls," *Journal of Applied Psychology,* 1927, 11, 1–7.

Another study selected samples of subjects by a different procedure. In previous research a delinquency index had been worked out comprising such variables as the duration of the delinquent career, frequency of appearance in court, and seriousness of offense as rated on a scale. From a group of 300 delinquents 64 were picked at each extreme in this delinquency index and these extreme groups were given an Interest-Attitude Test. This test involved checking items that were judged wrong, fears, worries, objects of interest, and qualities admired in other people. The qualitative results are of some interest: the highly delinquent group found only one thing that was wrong in the test and that was cowardice, or yellowness; they had more fears, anxieties and worries; they also were influenced by personal prestige more than any of the other qualities involved when they were asked to state characteristics which they admired in other people. This study confirms the others in a general way.[10]

This same test together with a Multiphasic Inventory (page 246), a social adjustment inventory, a masculinity test, and a social maturity scale were given to 100 delinquent girls in a State School and 85 public-school girls. Each subscale of the Multiphasic except that for hysteria yielded a statistically significant difference between the two groups—including such variables as hypochondria, depression, and paranoia. The social adjustment and social maturity measures likewise yielded significant differences. In order to check the possible influence of intelligence, 52 members of each group were selected whose I.Q.'s matched within two points. The differences still were significant with a very few exceptions.[11]

The foregoing results indicate some tendency toward greater personality deviation on the part of delinquents. The results are none too clear-cut, and it obviously would be difficult to find a specific test which would give a prognosis of delinquency with high validity. It is possible, however, for the clinical psychologist, supplementing psychometric devices with his interview techniques, to locate individuals whose chances of getting into trouble are somewhat greater than those of the ordinary individual. When such persons are located, the next step is to prevent their becoming delinquents. This program will be discussed in the next chapter.

---

[10] Durea, M. A., "The Differential Diagnosis of Potential Delinquency," *Journal of Orthopsychiatry,* 1939, 9, 394–398.

[11] Capwell, D. T., "Personality Patterns of Adolescent Girls," *Journal of Applied Psychology,* 1945, 29, 289–297.

Mentally Defective Criminals

Characteristics predisposing to crime. Mental defect or feeble-mindedness involves people at the lower end of the distribution of intelligence who are also socially incompetent. The moron, the imbecile, and the idiot were noted as three types of mental defectives, in order of decreasing intelligence. Our present concern is the possibility that some of these people, by virtue of their mental defect, may become delinquent. This would seldom occur with the idiot, because he is practically helpless. Only occasionally would imbeciles be involved in crimes because they are so obviously defective that people will be on their guard against them and they are usually under care. The moron constitutes the most serious problem, but, in the subsequent discussion, a sharp distinction will not be made between levels of feeble-mindedness.

It should be made clear at the outset that the psychologist does not believe in born criminals. The specific tendency to crime certainly is not inherited, but, like the mentally disordered, the defective has some characteristics which are apt to get him into trouble. In a sense, these characteristics "predispose" him to crime and stack the cards against him.

For one thing, the mental defective often is unable to compete satisfactorily with his fellows. Even the higher types have difficulty in standing up under competition. Although they can do useful work under supervision, they seldom succeed on their own which leads to frequent economic difficulty, especially when relatives do not assist them. The result may be illegitimate means of financing themselves—prostitution, vagrancy, or petty thievery.

A second characteristic is lack of foresight. The mental defective simply cannot think a thing through to the end and cannot foresee the consequences of delinquent behavior. The normal person contemplating a crime considers such matters as an alibi and is often deterred by the probable consequences of the act. The feeble-minded cannot think that far ahead. For example, a feeble-minded youngster wished to get married and needed money. He went to the home of an elderly lady of his acquaintance who was reputed to have a lot of money sewed in the hem of her clothing. He took a piece of gas-pipe with him, sat down and chatted with her a while, and was introduced to another resident who passed through the room while they were talking. Presently, he killed the woman with the gas-pipe, took the money, and went on his way, quite oblivious to the fact that he had been seen in the house just prior to the murder and would have no alibi. Such amazing lack of foresight is characteristic.

A third factor is that the defectives tend to act on impulse more than does a normal person. Ordinarily a person inhibits many of his impulses through fear of the consequences, but the defectives apparently are less able to do this. Moreover, they possess normal instincts and urges. This latter characteristic coupled with the lack of inhibition results in impulsive types of behavior that may have a delinquent turn.

Finally, the defective is inclined to be suggestible. Children are quite suggestible, and it is plausible that an adult with a lower mental age should be likewise. Consequently, if an idea of questionable behavior is given him, that idea probably will lead to action.

Incidence of mental defect among delinquents. One would expect to find many feeble-minded in the ranks of the delinquents, and numerous statistical studies along this line have been conducted. The typical procedure is to secure a sample of delinquent individuals—the population of a prison or an industrial school for juvenile delinquents—and examine them in some standard fashion with psychological tests and interviews to determine whether or not each individual may be classified as feeble-minded. Then, the proportion of feeble-minded in this sample is noted in comparison with the expectancy of mental defect in the general population. Studies of this sort have yielded markedly varied results for different institutions.

The results are more striking with juvenile delinquents than with adults. Many investigations report the average intelligence quotient of the delinquent sample. A number of such averages appear in Table 19;[12] obviously, the average intelligence quotient is distinctly below normal. The average intelligence quotient of a random selection of children would be 100: thus, with a sample which averages in the 70's or 80's, there will be a goodly portion below 70, which is considered the approximate borderline between feeble-minded and normal, provided that social incompetence is demonstrated also for those below the line. In the present example social incompetence is fairly well indicated by the delinquency, and considerably more than a normal proportion of the groups shown in the table can be presumed to be defective.

---

[12] Louttit, C. M., *Clinical Psychology*, page 374. New York: Harper's, 1936, and other sources.

TABLE 19

Average Intelligence Quotient of Juvenile Delinquents *

Sample	*Approximate Number*	*Average Intelligence Quotient*
Juvenile Court—Ontario	3,600	82
Juvenile Court	240	82
Juvenile Court—New York	1,400	73
House of Refuge—New York	550	78
Runaways	660	78
State School—California	400	92
Boys' School—Indiana	400	89
Miscellaneous—Boston and Chicago	4,000	90
Miscellaneous—England	200	89

* Louttit and others.

Several other studies along this line may be mentioned very briefly. Mental retardation was measured for a group of 115 delinquent boys in a state training school and 122 orphans in an institution. In this case it was desired to compare two institutional groups with similar environmental factors where one group was not delinquent. The members of the delinquent group, on the average, were retarded four years, and those of the comparison group only one year and eight months. This difference is large enough to be of some significance.[13] A study was made of inmates of a boys' industrial school and a girls' industrial school in Ohio, where the youngsters were placed because of delinquency. The usual clinical procedures were applied, and diagnosis was made of mental defect as well as of other aspects. At the boys' school 7 per cent were diagnosed as feeble-minded, and at the girls' school, 18 per cent.[14] In another sample of 3,279 reformatory boys 47 per cent had I.Q.'s below 68 on Morgan's Mental Test.[15] In a study of a thousand juvenile delinquents it was found that 13 per cent of those brought to the juvenile court had I.Q.'s below 70, and 17 per cent were borderline; only 42 per cent had I.Q.'s above 90.[16] Incidentally, in a five-year period after the recommendations of the juvenile court had been carried out, 88 per cent still continued to be delinquent, but the proportion decreased somewhat in a second five-year period. With another report on about 5,000 delinquents who passed through juvenile courts, including two samples in Chicago and two in Boston, the per cents which were diagnosed as feeble-minded were 13, 13, 12, and 16 respectively in the four samples.[17]

---

[13] Moore, J. E., "Comparative Study of Educational Achievement of Delinquent and Dependent Boys," *Journal of Education,* 1936, 14, 1-6.

[14] Growdon, C. H. and Calhoon, C. H., "An Analysis of Cases Admitted to the Boys' Industrial School and the Girls' Industrial School During 1931," *Quarterly Bulletin,* Managing Officers' Association of Ohio, Department of Public Welfare, 1933, 10, No. 4, 6–14.

[15] Caldwell, M. G., "Is the Reformatory Reforming the Prisoner?" *Journal of Juvenile Research,* 1934, 18, 90-102.

[16] Glueck, S. and Glueck, E. T., *One Thousand Juvenile Delinquents.* Cambridge: Harvard University Press, 1934.

The results are not so clear-cut with adult delinquents. To be sure, in a lot of the early studies there were reports of high incidence of feeble-mindedness in all kinds of delinquents. Pintner went through the available studies in 1931 and indicated that in the earlier period something like 42 per cent of delinquents were reported as feeble-minded, whereas the figure was around 29 per cent in the later studies.[18] Still more recent studies have further reduced this figure even for juveniles. One or two reports tend to minimize the incidence of mental defect among adult delinquents. Murchison[19] used data based on the Army Alpha Test: he took a number of samples of criminals from penitentiaries, compared the distribution in the tests with the Army norms, and found comparatively slight differences between the criminals and the soldiers. There were pronounced geographical differences in intelligence in the draft data, but Murchison's results held up fairly well when the criminals in a given region were compared with draftees from that same region. A further study along these same lines by Root,[20] was reviewed with Murchison's report and an effort was made to reconcile them.[21] Root's investigation involved a careful clinical examination—spending anywhere from eight to twelve hours per man—of 2,000 prisoners. This is obviously much more exhaustive and presumably more reliable than the half-hour or so involved in the Alpha Group Intelligence Test. Root found, incidentally, that the average intelligence quotient of his prisoners was 76—not very far above the borderline. The reviewer made certain necessary assumptions about Root's superior class and his moron and inferior groups as related to the letter classifications in the Army Test. His comparison of Murchison's and Root's work is given in Table 20. Attention is called especially to the bottom row of the table which gives the D and D— classes which are at least very low if not actually defective. The three Army groups yield a percentage of 24 in this intelligence range, whereas Murchison's Army sample gives 16 per cent, and the Pennsylvania Army group, 8 per cent. This last percentage would be the most satisfactory basis for evaluating adult criminals in a Pennsylvania penitentiary. Murchison reports for the criminals, 14 per cent for whites and 46 for Negroes, whereas Root, on the same basis, has 22 per cent for whites and 54 for Negroes. The 22 per cent *versus* the 8 per cent is the most crucial comparison inasmuch as the two groups came from the same state. The situation is more serious than it appeared in Murchison's data. Another investigator went over these same data with those of two other similar studies.[22] He attempted to apply a constant criterion of feeble-mindedness to the various investigations, basing it primarily on a mental age of less than 11. He found that the over-all ratio of feeble-mindedness in the criminal as compared to the non-criminal population was about 1.2 to 1. In other words, there was about a 20 per cent higher proportion among the delinquent groups. This is not as large as the figure involved in most of the studies of juveniles reported above. Healy's figure of 13 per cent may be compared with a rough estimate of the per cent of defectives in the general population of 2 or perhaps a little less, which would yield a ratio of 6.0 or 7.0, much larger than the 1.2 just cited.

---

[17] Healy, W. and Bronner, A., *Delinquents and Criminals, Their Making and Unmaking,* page 273. New York: Macmillan, 1926.

[18] Pintner, R., *Intelligence Testing,* page 337. New York: Holt, 1931.

[19] Murchison, C., "American White Criminal Intelligence," *Journal of Criminal Law and Criminology,* 1924, 15, 239–316; also Murchison, C., *Criminal Intelligence.* Worcester: Clark University Press, 1926.

[20] Root, W. T., *A Psychological and Educational Survey of 1916 Prisoners in the Western Penitentiary of Pennsylvania,* page 246. Board of Trustees of Western Penitentiary, 192

[21] Anonymous, *Journal of Applied Psychology,* 1929, 13, 96–102.

TABLE 20

Intelligence Distribution of Adult Criminals

Intelligence Class	*3 Groups*	*Army*		*Murchison Criminals*		*Root Criminals*	
		Murchison Sample	*Penna. Draft*	*White*	*Black*	*White*	*Black*
A	4%	5%	7%	5%	1%	7%	1%
B, C+, C	48	57	64	63	29	55	26
C—	24	21	21	18	24	17	19
D, D—	24	16	8	14	46	22	54

There are some extenuating factors which may account for the wide variations obtained in the different investigations: why the person was sent to the institution at the outset, and variations in success in isolating defective delinquents of different regions. For example, in a detention home in New Jersey 66 per cent were defective, whereas at a similar institution in Minnesota, only 7 per cent were defective when judged by the same standards. It developed that the higher proportion in New Jersey was due to the fact that there was no other place than a penal institution to which to send these defectives, whereas in Minnesota, at that particular time, there was room in institutions for defectives. Thus, the local situation may have much to do with how many defective delinquents go to the correctional institution rather than to an institution designed especially for them. Another variable is the tendency to get caught. Defectives are more apt to be apprehended because of lack of foresight, and, therefore, the proportion in the correctional institution should be discounted slightly. Results also vary with the type of institution. In New Jersey, for example, the state prisons have 6 per cent defectives, reformatories, 15, and the juvenile institutions, 30. Obviously, some selective factor is involved. This higher incidence among juvenile delinquents was noted earlier. It may be that many youngsters get into an institution for the mentally defective before they are really old enough to go to the penitentiary. It is possible that some of them are committed for minor offenses which would not be serious enough to send them to the penitentiary. Variables like the foregoing make interpretation of the over-all findings difficult. It is obvious that results vary a good deal according to where the sample is secured, but it is also obvious that there are enough defective delinquents to make it worth while to try to reduce the number of defectives.

---

[22] Celeny, L. B., "Feeble-Mindedness and Criminal Conduct," *American Journal of Sociology,* 1933, 28, 564–576.

Repeaters. Thus far in the discussion no distinction has been made between first offenders and those who are repeaters or chronic offenders. There are many of this latter type. It is not unusual to find in a prison population inmates who are serving their twelfth term. Apparently, they did not learn anything from their first incarceration that kept them out of subsequent trouble. It might be suspected that mental defect or maladjustment was contributory, and that supposition is borne out by the facts. In a New Jersey sample there were 4.4 per cent mental defectives among the occasional criminals, most of whom presumably had not repeated, and 8.5 per cent of the chronic offenders were diagnosed as mental defectives. Thus, the incidence of defect among the repeaters was almost twice that among the first offenders. In a study of adult sex offenders 25 per cent of the first offenders had scores below D— in the Army Alpha Test, whereas 52 per cent of the repeaters were in that range. The higher proportion of mental defect among the repeaters means that if offenses rather than offenders are considered, the problem discussed above is still more serious. After all, a crime prevention program is most interested in preventing as many *crimes* as possible.

Type of crime. It is interesting to consider the relation of mental defect to the type of crime committed. Defectives presumably would be incapable of certain kinds of crimes requiring considerable planning and insight and would be more inclined to commit offenses in which it was a matter of acting on a momentary impulse. The facts bear out this presumption. The first offense for which juvenile delinquents come in contact with the law generally is truancy. In one study of 100 normal and 100 defective boys at a bureau of juvenile research, 12 per cent of the normal and 50 per cent of the defectives had truancy as their first offense.[23] An investigation of English convicts determined the proportion of mental defectives among those committing different types of crimes. The psychological techniques were not too rigorous, but the comparative results might be of some significance. By way of control the per cent of the general population committing these same offenses was computed. The contribution of the defectives for five types of offenses was greatest for malicious damage of property and sex offenses, whereas with the general population, the contribution to those offenses ranked fourth and fifth, that is, at the other end of the list. The defectives evidently had a predilection for the impulsive crime. A study of adult criminals on the basis of the Army Alpha Test indicated a similar trend. Table 21 gives the intelligence distribution for three types of crime. It will be recalled that Class *A* is high and *E* is low intelligence. Twelve per cent of the offenders for fraud were in Class *A* and only 2 per cent in Class *E*. On the other hand, for dereliction, which includes desertion, vagrancy, begging, and abduction, and for sex crimes there are much smaller percentages

TABLE 21

Intelligence and Type of Crime *

	Fraud	*Dereliction*	*Sex*
A	12%	4%	4%
B	16	13	8
C+	25	18	14
C	25	22	27
C—	11	20	23
D	8	8	11
E	2	15	14

* Murchison

---

[23] Calhoun, C., *A Study of Mentally Deficient Delinquent Boys.* Ph.D. Thesis, Ohio State University, 1930.

at the top of the distribution and 14 or 15 per cent in Class *E*.[24] The same point is substantiated in a study of 135 persons convicted of forgery and 480 random inmates of a State Prison in southern Michigan. The average intelligence quotient for the control was 89 and for the forgers, 99, with a critical ratio of 6.6, which means that the difference was not accidental.[25] An incidental result was that the per cent of the individuals with previous sentences was 30 for the control, and 62 for the forgers. Previous incarceration had not rehabilitated the forgers, and apparently, they felt that they were clever enough to get away with it the next time.

It appears that the mental defectives are more inclined to get into impulsive crimes such as sex offenses, or destroying property, or committing an act of violence, whereas they are less prone to offenses involving more insight and planning. If one were to attempt to point to the particular groups of offenders where mental retardation is most serious, one probably would select the prostitutes and the vagrants. Some studies have brought out a high incidence of mental defect in women sex offenders. Such delinquency in men is usually less obvious and less apt to get them in conflict with the law. When such persons experience difficulty in competing in ordinary vocations because of their low intelligence, they often resort to this as an easy way out. The vagrant is often a person who cannot quite make the grade vocationally because of his low intelligence, tries one job after another, fails in all of them, finally gets discouraged, and takes a tin can over his shoulder and starts up the tracks.

Borderline and dull delinquents. It was natural that initial interest in intelligence as related to delinquency should go to the extreme and investigate the mental defectives, and the suspected relationship was discovered. However, it is well to look at the borderline and determine whether dull individuals like the outright feeble-minded constitute a problem. More effort has been devoted to planning for the severely handicapped, and the dull have been somewhat neglected. This neglect may have led them to develop antisocial attitudes and get into trouble when they were forced to compete with normal individuals. A few studies along this line may be cited.[26] A group of dull individuals with I.Q.'s averaging about 80, and a control group with an average I.Q. of 106—about 300 members in each group—were selected. Their histories were checked to find how many had been in juvenile court, police court, or jail. The results are summarized in Table 22: 13 per cent of the male dull individuals had been in juvenile court, whereas only 3 per cent of the normal males had been there. A rough over-all comparison may be had by noting the columns headed "Both." For juvenile court the figures are 9 and 3, for police court, 13 and 4, for jails, 7 and 1. With samples of this size the differences in percentage are just about significant statistically. In a similar study, there was no greater incidence of mental defect among the delinquents than the normal but a higher incidence of the dull. It is interesting to note that in this particular sample the dull seemed to be contributing more delinquency than the actual feebleminded.[27] This suggests that more consideration should be given to the borderline group in the delinquency picture.

---

[24] Murchison, C., *Criminal Intelligence*, page 62. Worcester: Clark University, 1926.

[25] Berg, I. A., "A Comparative Study of Forgery," *Journal of Applied Psychology*, 1944, 28, 232–238.

[26] Baller, W. R., "Study of the Behavior Records of Adults Who When They Were in School Were Judged to be Dull in Mental Ability," *Journal of Genetic Psychology*, 1939, 55, 365–379.

TABLE 22

Delinquency of Dull *versus* Normal; Per Cent in Various Delinquent Groups *

	Dull			*Normal*		
	Male	*Female*	*Both*	*Male*	*Female*	*Both*
Juvenile Court	13	6	9	3	3	3
Police Court	22	3	13	7	1	4
City and County Jails	11	1	7	2	1	1

* Baller

Other types. The mentally defective and mentally disordered criminals are by no means the only types of delinquents that interest the psychologist. There is, for example, the casual criminal. This is the individual who, for the most part, has led an upright life, but finally encounters circumstances which are too much for him. Perhaps he worked in a financial institution, played the stock market a little, borrowed some from the till expecting to pay it back, but lost the money and eventually was caught. Or he got into a condition of dire need and stole food. He simply encountered circumstances with which he could not cope. This behavior could not have been predicted by any existing psychometric device, although it may be possible ultimately to develop some sensitive personality tests for this purpose. Therefore, little can be done at present for these persons in a preventive way. However, when the casual criminal actually is sentenced, the effect of punishment on him is a problem, and it is desirable to arrange things so that he does not become a confirmed criminal during incarceration.

---

[27] Shakow, D. and Millar, D., "Psychometric Studies of 150 Adult Delinquents," *Journal of Social Psychology*, 1935, 6, 437–457.

The professional criminal constitutes another class. Some individuals of presumably high intellectual ability devote their careers to crime—sometimes with outstanding success. Forgers are higher in intelligence than most other types of criminals. Here again, it is impossible to put one's finger on any direct causative factor. The professional criminal evidently has something wrong with his general philosophy. It may go back to his early education or other environmental influences, but it would be impossible to trace the development of these particular attitudes without a detailed case history. Professional criminals at the other end of the intelligence distribution—the prostitute and the vagrant—should be mentioned. They may be classed as professional inasmuch as the delinquent activity constitutes their only occupation and provides their livelihood.

Criminals by compulsion, where someone else is to blame, constitute a small class. The criminal may be a child or a low-grade adult forced by parents or by other members of his gang to do something questionable. Children are often used to pass small packages containing narcotics. In such instances, obviously, the problem goes back to the one that did the compelling rather than the offender himself.

General conclusions. The foregoing discussion of different psychological types of criminals should not give the impression that this is the whole story. Psychological factors in crime are often masked by socioeconomic factors. There are studies, for example, which show significant correlations of crime with poverty or with the extent of financial aid provided families in a given locale. Maps which give the delinquency rate in various areas of large cities show definite foci of delinquency often correlating with the underprivileged character of those regions, which suggests that economic status is a causative factor. Such data, however, must be interpreted carefully. It is conceivable that everything goes back to some more fundamental cause. It is possible that a person with low mental capabilities gets into economic difficulty because he cannot compete and the economic difficulty leads to crime. The crime might have been forestalled if the person had had better intellectual capacity to start with, or if he had received some help in making a vocational adjustment into a field where he might achieve enough success, at least, to support himself. This suggests the desirability of both an hereditary and an environmental approach to the problem of decreasing crime. There used to be a vigorous controversy on heredity *versus* environment as contributory to delinquency. The psychologist felt that inherited mental shortcomings were the entire story, and the sociologist believed that nothing but environment mattered. The trend now is for the two professional groups to sit on the fence and discuss their common problems. The present book is not devoted to sociology and will not present data regarding environmental factors in crime except in so far as they are psychological in nature. It is the writer's conviction that innate differences play a part and that environmental factors also are important. If the specialists in both fields do their utmost in coping with the delinquency problem, there will be enough work for all of them and their efforts will supplement each other rather than conflict.

Suggestion as a Cause of Crime

Associates. A source of crime that interests the psychologist is suggestion, which is essentially a process in which an idea is kept before a person vividly until it leads to action. In the more extreme case of hypnosis the chair is suggested to be a bicycle, and the subject reacts accordingly. Suggestion and imitation are also very closely related. The idea usually comes to the individual verbally in suggestion, but in imitation he gets the idea from observing someone else. If someone yells, "Jump!" and others do so, that constitutes suggestion. If, on the other hand, the leader jumps and the others follow suit, that is imitation.

It is possible to trace some delinquency, particularly on the part of juveniles, to the associates with whom the offenders work or play. If a person belongs to a gang whose members are indulging in petty crime, it is perfectly natural for him to follow suit. It may involve simple things like breaking windows, vandalism, or throwing missiles at a police officer. Petty thievery is often a starting point which leads to stealing in a larger way. Perhaps a youngster starts smoking precociously, then tries other kinds of drugs, and eventually becomes an addict. The suggestion is augmented in many cases by a certain amount of social pressure. If someone does not participate in the activity, he is laughed at and, in an effort to achieve status with the group, he adopts the questionable behavior.

Homes. Another source of criminal suggestion lies in the home situation. If the youngster holds the flashlight for his father who is opening a safe the implications are obvious; fortunately, this degree of indoctrination is infrequent. Often it is not a matter of major delinquencies but rather the general moral laxity of the home. If the mother has a boy friend outside the family, it may create unfortunate attitudes on the part of the adolescents in the family. If there is a good deal of contention in the home, the younger members may develop irascible antisocial attitudes just through imitation. An unstable or emotionally charged home has a lot of potentialities along this line. We noted in Chapter 10 how unfortunate home conditions sometimes produce mental maladjustments, and delinquency may be one evidence of such maladjustment. There are some indications of the effect of irresponsible parenthood on juvenile delinquency. In a British study the per cent of delinquents from broken homes was about 30 per cent when they were broken by death and 16 per cent when there was voluntary separation. The corresponding figures for a comparable group of non-delinquents were 17 and 1 per cent respectively.[28] Many times a home that is broken psychologically is just as bad as one that is broken legally. Another difficulty is that an unfortunate climate in the home drives the individual outside for his satisfactions and somewhat enhances the probability of his getting into trouble. This result is not directly traceable to suggestion, but is a by-product of an unfortunate home situation.

Newspaper publicity. An appreciable source of criminal suggestion is the publicity provided by various media. Newspapers, for instance, often play up crime news with large space on the front page and with big headlines. Part of this reflects the general tendency to give the public what it wants in the interest of making the paper commercially profitable. From the standpoint of suggestion, however, it is unfortunate that people can read details of just how the blanket was arranged so that the jewelry store window could be cracked without making too much noise, or just how the safe was drilled. The accounts often give a good deal of know-how, and sometimes constitute a good criminal handbook. Then, too, there is the unfortunate attitude often created by this publicity. Crime appears to be commonplace and something that almost everybody does, which tends to make it seem less serious. Moreover, the criminal often is played up in attractive fashion. The public enemies get a good deal of publicity about their cleverness in evading the agencies which are pursuing them. The difficulty even extends to commercial advertising: a motor company advertised to the effect that when Dillinger, who was, at the time, Public Enemy No. 1, went into a garage to steal a car to make a getaway, he chose a V-8. This sort of thing shades over into the hero worship that adolescents develop for almost any public character who receives a lot of publicity. There also may be undesirably flippant reports on the court's activities, and oftentimes the story is one-sided.

There is ample anecdotal material showing the relation between suggestion in the press and crime. A little girl, for example, stole a horse and tried to sell it although she knew practically nothing about horses, not even how to feed them. A boy took $50.00 from the cash drawer where he worked because he had read about it in the papers. After every big kidnapping case, a lot of people receive blackmail letters of some sort.

---

[28] Burt, C., *The Young Delinquent,* page 62. New York: D. Appleton, 1925.

After the Leopold-Loeb Case, for example, about a hundred letters demanding ransom were turned over to the police. Even the suicide squad testifies to trends which manifest suggestion or imitation. When a few people start drinking iodine, a lot of others do the same thing, presumably having read about it. Later, bichloride of mercury may be the favorite potion.

There have been many studies in which delinquents were questioned about the things that led them into crime. Sometimes they were provided with a checklist which included newspapers. An approach of this sort is a little too leading to give completely valid results. However, many such studies have indicated an appreciable frequency of newspaper stories as causative factors in crime if the statements of the delinquents themselves are to be trusted. Even with some discount the over-all picture indicates a factor of at least some significance.

Books and periodicals. It is much the same story with publicity given to crime in book or magazine fiction. From the standpoint of suggestion there is the additional feature that the book or magazine usually is read in a more leisurely attitude which is conducive to greater suggestion. Readers scan the newspapers hastily, looking at headlines and reading a bit here and there, but they sit down and relax with a magazine. Here again, there is much detail about just how the crime was committed. One professional criminal who ran a large organization had an elaborate library of detective stories. These had all been carefully annotated in the margins and there was even a cross-index. For the average reader the situation is similar to the press situation—it is informative regarding details of the crime and an attitude is created of accepting crime as an everyday form of behavior which might even be condoned.

Moving pictures. The movies are an insidious source of suggestion, especially for the young people. Reading a book or newspaper requires a certain amount of effort and some people do not bother, but movies operate on the involuntary attention and what is transpiring cannot be ignored. Here again, the details of the crime are played up too completely. The graphic presentation usually is more vivid than the verbal. With such techniques as the close-up, it is possible to show exactly how the job was done. An insidious aspect is that there is a certain glamour that goes with the criminal and his behavior in many films. It is a case of negative suggestion which does not operate as such. The picture is often "justified" on the ground that it teaches a moral lesson to the effect that crime does not pay. To be sure, the criminal is worsted and at the end finally gets the penalty, but the audience spends an hour or two observing him demonstrating smart types of behavior and enjoying himself with swanky cars and attractive clothes. The negative suggestion that one should not do thus may not stick in the youthful mind, but the glamour of the criminal's life may. The final thirty seconds of the reel in which the rope is tied under his left ear is not enough to offset the more positive suggestion of the good time that he had while it lasted. As a matter of fact, some people go to the movies not to find that crime does not pay, but hoping to find how it could be made to pay after all. Experiments have indicated how attitudes can be changed by moving pictures (page 100). One was cited in which youngsters executed some attitude scales which measured their attitude toward the Chinese, saw a film which was favorable to that race, and manifested a shift in the favorable direction on a subsequent scale. By the same token, it is possible to create criminal attitudes by moving pictures. The same principles, of course, apply to the drama, but the number of people attending stage plays is almost infinitesimal compared to those who see the moving pictures.

Radio has potentialities in this same direction when it involves the crime theme. A radio program gave details for putting a piece of paper in the slot of a public telephone in such a fashion that the nickel subsequently could be extracted with a wire. In one city the telephone company had to employ two men for several days to remove paper from slots. Moreover, just as in the movies, the criminal performs with bravado, and the listeners come to take crime as more or less customary. Similarly, negative suggestion fails to function as a deterrent for crime.

Short of outright crime in the legal sense some of these same mechanisms of suggestion operate with reference to general social laxity. The publicity given to divorce and questionable sex behavior on the part of people who are well-known, perhaps through their connection with the entertainment field, serves as a suggestion to lead others to consider that type of behavior as quite the normal pattern. Unfortunately, such people sometimes trade on their own marital maladjustments for the publicity value they will have. The unfortunate suggestion for the adolescent admirers of these characters is obvious.

Drugs and Crime

Narcotics. There are relations between the use of drugs and criminal behavior which come within the purview of the psychologist. The narcotic drugs are a case in point because, quite apart from their medical effect, there is psychologically a tremendous urge on the part of an addict. If a person is really addicted to a drug, he will stop short of nothing in order to secure a supply. Persons who have not been addicts themselves find it difficult to appreciate the compelling character of addiction. It may lead the individual to violate the drug law or to commit other offenses in order to get money to purchase a supply of the drug. An addict will commit a most desperate robbery or assault for the purpose. He may commit an act of violence in a medical office in the process of trying to extort or steal a further supply. Sometimes the effect of the drug itself is to create a feeling of self-sufficiency so that the person will attempt almost anything (cocaine in one stage acts this way), which provides additional impetus for an act of violence.

The potency of this urge may be seen indirectly in a study of court records of 60 morphine cases.[29] Before addiction, these cases had committed altogether 50 offenses of some sort, none of them violations of the drug law. These same individuals, after addiction, accounted for 159 offenses for violation of the drug law and 331 other offenses—a total of 490. This is almost ten times the number of offenses committed prior to addiction. This ratio should be discounted in the light of the fact that some of them had more years after addiction than prior to addiction in which to commit the offenses. Even so, the before-and-after difference indicates something of the seriousness of the narcotic problem and corroborates the tremendous motivation mentioned above.

Addicts are developed in various ways. Some youngsters begin using the drug just for social purposes much as they learn to smoke because some of the others are doing it. They are urged to try a little "snow," perhaps get too much, and soon have the habit. Moreover, addicts like company and try to get others to join them; sometimes they deliberately try to create other addicts as part of a gruesome social philosophy. Those who are in the business attempt to create addicts in order to develop a market for their products. There are occasionally accidental cases following some legitimate use of the drug; a person, after some medical treatment, is given a small supply of the drug to use in case he needs it and perhaps uses too much.

Alcohol is not actually narcotic but its use may become habitual, and even a single inebriation may be fraught with delinquency. The characteristic psychological feature of alcoholic poisoning is a weakening of inhibitions. The individual who is normally restrained by social conventions will lose some restraint under alcohol. The feeling of superiority that goes with it is illusory, and it actually is a depressant. Numerous experiments have been conducted on this point; some of the earlier ones especially were worthless because they did not introduce adequate control. The subjects took mental tests, drank a certain amount of an alcoholic beverage, and then took the tests again. No effort was made to control suggestion. Consequently, those who thought the drink was good for them improved on the second test, and those who thought it had a deleterious effect did more poorly on the second test. The proper way to control suggestion is to arrange it so that the subject sometimes receives the alcohol and sometimes a neutral dose—water—but does not know which is which. This may be achieved by giving the dose in capsules which dissolve in the stomach. Under such circumstances the effect has been found to be definitely depressant. Just one study will be cited.[30] The length of time required for the knee jerk reflex increased 10 per cent. In the same reflex the thickening of the muscle of the upper leg decreased 40 per cent. Speed of winking when a small felt hammer hit a piece of glass in front of the eye was slowed 7 per cent. The extent of eyelid movement was reduced 19 per cent. In an experiment where the subjects looked at a fixation point and then, as a light appeared in the margin of the visual field in one of several directions, they turned the eye to look at the light as quickly as possible, the speed of starting was reduced 5 per cent and the speed of the eye movement 11 per cent. Ability to detect slight changes in electrical current dropped 14 per cent and speed of tapping—a simple psychomotor response—was reduced 9 per cent. Other investigations that were carefully controlled have pointed in this same general direction. It is significant that a dosage of alcohol which may not show any clinical symptoms, nevertheless is sufficient to slow down one's response. This has an obvious bearing on automobile driving under conditions of stress where quick reaction may be necessary.

---

[29] Sandoz, C. E., "Report on Morphinism to the Municipal Court of Boston," *Journal of American Institute of Criminal Law,* 1922, 13, 10–55.

The chronic alcoholic is found less frequently than the ordinary imbiber who may commit various crimes, particularly of violence or sex, as the result of the lowered inhibition mentioned above. The chronic alcoholic has these tendencies raised to a higher degree. He may get into this condition largely as a means of escape from some other frustration. In New Jersey, for example, 18 per cent of convicted murderers were diagnosed as chronic alcoholics.[31] Thus, it is obvious that alcohol may make some contribution to the incidence of crime.

Summary

The modern attitude toward criminals as contrasted with the classical attitude stresses the individual case. In accordance with this point of view the psychologist is interested in types of individuals who are more liable to commit crime. One such type is the mentally disordered individual. The schizophrenic delusions of persecution result in an act of violence, and the general instability of the schizophrenic also may lead to crime. The paretic may have delusions of grandeur and spend his imaginary money or may commit sex assaults. Manic depressive cases are inclined to be quarrelsome and indulge in wanton destruction of property. A melancholic may commit suicide and kill other persons at the same time. A senile dement often engages in petty thievery and minor sex offenses. The epileptic may commit an act of violence during a seizure and subsequently have complete amnesia for the act. Sadism is a sex perversion centering around cruelty and may lead to anything from throwing dirt on a person to the most ghastly type of murder. Fetishism is a less serious perversion which often leads to stealing objects which serve as the fetish.

---

[30] Dodge, R. and Benedict, F. G., *Psychological Effects of Alcohol.* Carnegie Institution of Washington, D. C., 1915.

[31] Frankel, E., "1000 Murderers," *Journal of Criminal Law and Criminology*, 1938–1939, 29, 685.

Apart from outright psychopathic conditions, considerable delinquency can be traced to mental maladjustments or complexes. As an outlet for some frustration, the individual engages in such minor crimes as kleptomania. Experimental studies of delinquents and non-delinquents have shown a higher incidence of mental maladjustment in the former group. Although crucial statistics are difficult to secure, there is ample evidence that the frequency of mental disorder among delinquents is high enough to suggest that control of such disorders would contribute to crime prevention.

Aside from actual mental disorder various personality deviations contribute to delinquency. Studies of delinquent and control groups with neurotic inventories, interest-attitude tests, and multiphasic personality tests have shown, with considerable consistency, that personality deviations are more frequent among the delinquent samples. Such tests are subject to some error in that they depend upon the subject's truthfully expressing his attitude regarding various items, but if they are supplemented by other clinical techniques, they might make it possible to locate some individuals who were more likely to get into trouble and should be treated accordingly.

Mental defectives have certain characteristics which increase the probability that they will become delinquent. They are unable to compete satisfactorily and, hence, unable to finance themselves legitimately; they lack foresight, cannot think behavior through to its consequences, and, hence, are not deterred by fear of penalties; they are inclined to act on impulse without inhibition, and are likewise suggestible. This does not mean that they are born criminals, but the cards are stacked against them. Numerous investigations have been made of the incidence of mental defect among delinquent samples. The results vary considerably with the different samples. A high incidence is found quite consistently with juvenile delinquents, but with adults the results are more equivocal and depend on such things as the success of the community in isolating defective delinquents in appropriate institutions and on the tendency for defective delinquents to get caught more readily. There is clear evidence that repeaters comprise a higher proportion of mental defectives than do first offenders. It also develops that the mental defectives are more inclined to commit crimes depending on impulse—truancy, sex offenses, and malicious damage to property—whereas they seldom engage in forgery or fraud. There are further indications that quite apart from the downright feeble-minded, the borderline, or dull, individuals contribute appreciably to delinquency. The results certainly warrant attention to the mentally defective and borderline groups in the interest of reducing delinquency.

Another type of criminal is the casual type who gets into a situation that is a little too much for him. Nothing in the way of a psychological technique could foresee the results. There is also the professional criminal who may be very intelligent and simply have an incorrect philosophy and social attitude. At the other intellectual extreme are some mental defectives who are also professional criminals in the sense that they have no other vocation than prostitution or vagrancy. Many of the foregoing trends are masked by socio-economic factors. Economic difficulties often do contribute to delinquency. The present notion is that neither heredity or environment is the sole cause but that both should be considered by appropriate experts.

Suggestion is an appreciable cause of crime. It may come from a youngster's associates who engage in questionable practices; it may arise from home conditions, particularly in the case of a home that is broken in the psychological sense, or where there is considerable maladjustment. Further suggestion comes from the various media of publicity such as the newspapers, books, and magazines. The crime is presented with too much informative detail, it comes to be accepted as everyday practice, and the criminal is played up as interesting and clever. In the moving pictures, likewise, the criminal is represented as a glamorous individual who has a good time while it lasts. The negative suggestion that one should not do this kind of thing does not leave as lasting an impression as the more attractive and exciting aspects of the criminal's behavior. Radio may contribute along the same lines.

Drugs make some contribution to delinquency, particularly the narcotic drugs. The addict has a tremendous urge to get more of the drug and will stop short of nothing in the effort to do so. The difference between the number of delinquencies committed by a group of addicts before addiction compared with the number after addiction is striking. Alcohol, although not a narcotic, does contribute to crime. The individual has lowered inhibitions and is more inclined to act on impulse. Contrary to popular belief, alcohol actually is a depressant when studied under laboratory conditions. The foregoing psychological sources of crime may form a basis for a preventive program to be discussed in the next chapter.

15

PSYCHOLOGICAL FACTORS IN CRIME PREVENTION

Pre-Delinquency

OUR NEXT CONSIDERATION is what to do about crime in the light of the psychological factors we have noted. Pre-delinquency involves discovering the potential delinquent with a view to forestalling offenses. Diagnosis of mental defect or disorder may contribute to this end, although not all such persons commit crimes but they do have a greater potentiality than has the normal individual. Usually, they can be forestalled if they manifest some symptoms of the disorder before they actually commit a crime.

Cooperation of relatives. One way to meet the problem is to educate the public so that relatives or friends of an individual who is in a critical condition will take some cognizance of the fact and secure expert help. If a member of a family begins to manifest delusions or to develop a shut-in personality, expert advice should be sought. The sooner appropriate treatment is applied the better, because ultimately a crime may develop as an additional symptom of the approaching psychosis. Similarly, effort on the part of relatives of backward or feeble-minded children to conceal the fact and keep the child at home when they are unable to care for him adequately is misdirected. Sooner or later the individual will break loose and, in a moment of impulse, do something of a delinquent nature. There is a tendency on the part of relatives to rationalize the situation with wishful thinking. They figure that a pre-schizophrenic member of the family is merely going through adolescence and will outgrow the symptoms, or that the high-grade moron had poor teachers in school and hence has made inadequate progress. Education of the public to their social responsibilities in such cases would help to forestall subsequent misfortune.

Chronic complainants. The police are often in a position to help in this matter of pre-delinquency. Many persons in the initial stages of mental disorder find fault with things in general and make numerous complaints to the police. Almost any large department has its chronic kickers, who call up repeatedly about things of minor character. Some of them are found to be in the early stages of a psychosis upon investigation.[1] The police record of one city showed that a man who subsequently was diagnosed as a schizophrenic complained of (1) neighbors throwing rubbish in his yard, (2) persons poisoning grain and putting it in his chicken yard, (3) neighbor's chickens, (4) pigeons flying close to the house, (5) dead rats in the lot back of him, (6) neighbors' tin cans in the vicinity, (7) dogs' yelping. He wrote anonymous letters to various dog owners and poisoned their dogs. This behavior was diagnostic and prognostic of what was in store. Again, a middle-aged woman made repeated complaints of suspicious characters around the premises and even in the house. She shot a revolver out into the yard on several occasions. She likewise heard people slandering her and took these various matters up with the police. She was headed for melancholia. It might be well for a police department to run down these chronic cases carefully and have somebody in the vicinity primed to watch them for other instances of mental abnormality so that they might be committed to an institution before it is too late.

Other police contacts. Sometimes the police can get their cue from the fact that an individual applies for a permit to carry fire-arms in order to protect himself from a persecutor. One man, for example, was being pursued by the Masons, the Catholics, and some European rulers because they wanted his power: he was Lucifer. He asked the police for a permit to carry a revolver, but they refused and did not investigate. Later he secured a weapon from some source and ran amuck in the railroad station. A little investigation after the original request might have led to an earlier discovery of the psychosis. In another instance a man and woman came in to the domestic relations court complaining about each other in extreme fashion. They were examined clinically and both had schizophrenia, but as they had come in voluntarily and had committed no offense, they were not detained. Two years later, the woman murdered a small child that came to the house and then cut her own throat. Probably, this outcome could have been prevented if steps had been taken to get the couple committed at the time of their original appearance in court. The police may also find it profitable to watch children with some questionable history more closely. Teachers also may cooperate by informing the authorities about problem cases. Once the cases are spotted, they may be watched for any evidences of instability and perhaps be referred to some agency for more careful examination.

---

[1] Larson, J. A., "Paranoia and Paranoid Personalities: A Practical Police Problem," *Journal of the American Institute of Criminal Law and Criminology,* 1923, 14, 350–375.

School retardation. It is well to be suspicious of the child who is considerably retarded in school because this may be an indication of dullness or even borderline mental defect. The school program is, in a way, a prolonged intelligence test, and those who are unduly low in the intelligence distribution do not get promoted. They often cause disciplinary problems for this same reason. Thus, the school should watch retarded children more closely, because defectives are more likely to get into trouble.

Psychometrics. School retardation, however, is inferior to actual diagnosis with intelligence tests, and children are given such tests in many school systems nowadays. The schools do not use, to so great an extent, other such psychometric devices as personality tests, although they have been tried occasionally for experimental purposes rather than as a part of systematic routine procedure. If the school is equipped with such tests, the time may come when they will be quite useful, perhaps fully as useful as the intelligence tests, in locating potential delinquents. If a school psychologist is available, he can discover cases of personality deviation either by tests or clinical interviews.

Early delinquency prognostic of later. Although it is rather like locking the barn after the horse is stolen, an initial instance of delinquency, even of a minor character, is frequently prognostic of later delinquency, perhaps of a more serious character. Many adult delinquents gave the first manifestation of their tendencies by repeated truancy when they were in elementary school. There have been investigations showing a definite correlation between earlier and later delinquency. One such study involved 93 case records which had been closed by the Bureau of Research and Guidance of the public schools in Berkeley, California. The boys had reached an age of twenty-one and the girls, eighteen. These cases had been referred to the bureau because they were "problem children." At the time that the records were closed, 92 per cent had become delinquent or criminal.[2] In an analysis of the careers of 2,000 criminals, one authority concludes that the potential criminal is found "among school truants and runaways, children with abnormal home backgrounds, children with bad habit factors and problem children."[3] Similarly, 88 per cent of a thousand juvenile delinquents had further offenses within the next five years following the first offense. This all suggests that problem children or those guilty of some minor delinquency should be watched more carefully because of further delinquent potentialities. It may be a matter of putting the child in a situation where he is less apt to have trouble, or of improving his own personal adjustment, or, in the more extreme cases, of institutionalizing him before things reach the point where he becomes dangerous.

---

[2] Bodin, M., "Do Problem Children Become Delinquent and Criminal?" *Journal of Criminal Law and Criminology,* 1936, 27, 545–559.

[3] Glueck, E. T., "Newer Ways of Crime Control," *Harvard Educational Review,* 1939, 9, 194–204.

Eugenics

A profitable approach to the prevention of crime has been proposed by the advocates of eugenics—control of the quality of society by selective breeding. It is pertinent to the present discussion inasmuch as it has been shown already that mental defect or mental disorder contribute appreciably to the incidence of crime. To some extent these characteristics are hereditary. Hence, control of the breeding of the mentally defective and the mentally disordered will make some inroads on crime. The present section will investigate this possibility in more detail.

Inheritance of mental defect. It was noted in Chapter 4 that the intelligence quotient is fairly constant and that identical twins reared apart are nevertheless quite similar in intelligence even though they had been subjected to different environmental influences. Other studies have pointed to this hereditary aspect of intelligence. Children between eight and fourteen years of age were given standard intelligence tests (Otis). Correlations were computed between the intelligence of pairs of brothers and sisters. For identical (monozygotic) twins the correlation was .84; for fraternal (dizygotic) twins the coefficient was .51; and for brothers and sisters who were not twins, .32,[4] which suggests that intelligence is hereditary.

In the present connection it is the lower end of the scale that is of interest. One approach is to note the incidence of mental defect among twins. With 35 pairs of identical twins one of whom was mentally defective, the other was defective too in 94 per cent of the cases. With 60 pairs of fraternal twins where one was feeble-minded, the other also was feeble-minded in 53 per cent of the cases.[5] These results are what would be expected if heredity is an important factor.

Further light on the problem may be obtained by selecting mentally defective parents and noting the status of their children. The British

---

[4] Hermann, L. and Hogben, L., "The Intellectual Resemblance of Twins," *Proceedings of the Royal Society of Edinburgh,* 1933, 53, 105–129.

[5] Rosanoff, A. J., "Sex-Linked Inheritance in Mental Deficiency," *American Journal of Psychiatry,* 1931, 11, 289.

Commission on Sterilization ran down some 3,247 cases where a mother was feeble-minded and 486 cases where a father was feeble-minded. Data were available on 1,802 children between seven and thirteen years of age from these defective parents. Seventeen per cent were diagnosed as feeble-minded and 23 per cent as retarded. In another sample of 1,848 children over thirteen years of age with such parents 32 per cent were feeble-minded and 13 per cent retarded.[6] This incidence of mental defect among the children of questionable parents is obviously much greater than its frequency in the general population which is probably of the order of 1.5 or 2 per cent. It is always difficult, however, to gather adequate data of this sort because of uncertainty regarding the male parent. In many instances where a man and wife are feeble-minded and have a normal offspring, it is not certain that both of them were involved in the parenthood of that offspring—normal heredity from outside may have entered the situation.

It is possible also to secure a sample of feeble-minded children and investigate the status of their parents. In Massachusetts 3,553 children were selected who were doing poorly in school and who, on the basis of examination, were classed as defective, but not sufficiently so to warrant institutionalization. Obviously they were at the higher end of the mental defective range. Seven per cent of them had one or both parents feeble-minded. However, for 39 per cent the status of the parents was not known so that the 54 per cent with parents known to be normal should constitute the basis for comparison. In this same sample 3 per cent had parents with mental disorder. For a group of defectives in a state school the percentages were appreciably larger. Sixteen per cent of the group had one or both parents feeble-minded, and 42 per cent of them had parents whose status was unknown.[7]

In the two preceding studies there were many instances where the mental status of the parents could not be checked. One study which did not have this limitation[8] comprised forty-five feeble-minded individuals in institutions whose parents were given Binet tests. Seventy-three per cent of these inmates had one or both parents below the borderline. The mothers were a little lower than the fathers, the average I.Q.'s being 64 and 73 respectively. Moreover, the intelligence of the fathers was relatively low compared with the intelligence of the occupational groups to which they belonged.

---

[6] *Report* of the Departmental Committee on Sterilization. London, His Majesty's Stationary Office, 1934.

[7] Dayton, N. A., "Survey of Retarded Children in Public Schools of Massachusetts," *American Journal of Psychiatry,* 1927–28, 7, 809–835.

[8] Moorees, Z., "Immediate Heredity of Primary Aments," *Journal of Applied Psychology,* 1924, 8, 89–127.

All of this suggests that mental defect runs in families. The author of a widely used text in genetics states, "The vast majority of feeble-minded individuals owe their defects to hereditary factors."[9] Family histories that are recorded in detail bear out this same point. A typical one[10] analyzes the family tree of a girl who was in an institution for the feeble-minded in New Jersey. The field workers who were interviewing relatives were puzzled in tracing back the ancestry by discovery of two distinct strains in the family—a good one and a bad one. It developed that in Revolutionary times a Martin Kallikak (the name is fictitious), who presumably carried a recessive defect but was himself normal, had a child by a feeble-minded girl. She named the moron after its father. Later, Martin married a normal woman and established a dynasty from that mating. The child by the feeble-minded girl also started a long line of descendants and the two lines apparently did not cross. The results were impressive. Out of 496 descendants from the normal mother, there were only 3 who were degenerate, 2 who were alcoholic, and the rest were normal. On the other side, stemming from the feeble-minded girl, out of 480 persons there were 143 presumably feeble-minded, 46 known to be normal, 36 illegitimate children, 35 sex offenders, 24 alcoholics, 3 epileptics, 82 that died in infancy, and 3 actual criminals. They cost the state of New Jersey hundreds of thousands of dollars. This case is frequently cited to show what the injection of a feeble-minded strain into a stock may do. To be sure, the results are influenced by the fact that the feeble-minded parents do not provide a good home for the feeble-minded offspring, and the latter's adjustment becomes still less successful. However, studies on twins reared apart and on the correlation between the intelligence of children in the same family, tend to strengthen the interpretation of this trend in the Kallikak family as very considerably due to heredity.

The question arises whether this inheritance of mental defect follows any general principle so that it is possible to predict with some degree of certainty. Some of the earlier studies suggested that the strain acted very much like a recessive following Mendel's Law of inheritance. This law has to do with dominant and recessive traits; the dominant trait appears in an offspring if the tendency is inherited from either parent, whereas the recessive appears only if it is received from both parents. The law presupposes three kinds of parents, those who can transmit nothing but the dominant trait, those who can transmit nothing but the recessive trait, and those who have a fifty-fifty chance of transmitting dominant or recessive trait. For example, white coat color proves to be a recessive characteristic for guinea pigs. If both parents are white, they can transmit nothing but whiteness, and the offspring are white. If, however, both of them are "simplex," that is, both equipped to transmit black or white determiners with equal frequency, about a fourth of the time they both transmit determiners for blackness, in another fourth both transmit determiners for whiteness, and about half the time, one parent transmits black and the other white. The result is that the fourth of the offspring who inherit nothing but the whiteness will show the white characteristic; the fourth that inherits nothing but blackness of course is black; for the remaining half who inherit whiteness from one parent and blackness from the other, the black characteristic dominates and the individual is black although he is carrying potentialities of transmitting black and white about equally. It is not worth while to elaborate this principle in further detail. Suffice it, however, that there were early indications that mental defect acts much like a recessive and appears about one fourth of the time when both parents are normal but both carry the hereditary taint. Moreover, when both parents are feeble-minded, practically all the children are. It is difficult to check this principle adequately because an accurate diagnosis of feeble-mindedness in the ancestry is impossible unless the ancestors are present for actual examination. In most cases it is necessary to infer indirectly the intelligence level of the preceding generations. Later workers in this field are not so sure that mental defect is strictly a unit character in the simple Mendelian sense. They do find, however, that when both parents are feeble-minded, there is a very high proportion of feeble-minded offspring which is an important consideration from the standpoint of eugenics. Penrose presents elaborate statistics and probabilities to the effect that the low-grade type of feeble-mindedness, at least, acts a good deal like a single recessive gene.[11]

---

[9] Snyder, L. H., *Principles of Heredity*, page 393. Boston: Heath, 1940.

[10] Goddard, H. H., *The Kallikak Family*. New York: Macmillan, 1937.

Granted that mental defect is inherited, a further consideration is the extent to which the defectives of one generation contribute to the next. This depends somewhat on their fertility. Slightly contradictory evidence is available on this point. In an extensive investigation in England it was found that the average number of children in families that had all their children in ordinary schools was 4, whereas for those families that had at least one child in a special school for defectives the average number was 7.3. Another study in this country, however, in which "proper correction for error of selection" was made, yielded corresponding figures of 3.5 and 3.6.[12] A study on the European continent tended to corroborate the British study.[13] In a sample of families, gathered before 1911, the average number of children for normal families and for those containing defectives were respectively 3.3 and 5.7. Between 1911 and 1920 the corresponding figures were 2.1 and 3.2. Between 1921 and 1925 they were 1.7 and 2.3. There is an obvious decrease in the size of both kinds of families but those containing defectives are still consistently larger. Another straw in the wind is the fact that within the feeble-minded sample the average I.Q. of the children varies inversely as the size of the family. When there is one child the average I.Q. is 73, for five children it is 71, and for ten children, 68. A similar trend has been found outside the feeble-minded range with the average I.Q. of only children being 108, that of children with five brothers or sisters, 92, and that of children with twelve brothers and sisters, 80. At any rate, it appears that the mental defectives are at least holding their own and probably contributing a little more than their share to the population. The saving feature is that they have a somewhat higher infant mortality. This may be due in part to the fact that the feeble-minded parents are less able to take adequate care of the offspring. If it were not for this, their net fertility would doubtless be greater.

---

[11] Penrose, L. S., *Mental Defect.* New York: Farrar and Rinehart, 1934.

It is many centuries since natural selection ceased functioning in a large way with the human species. There was a time when very few morons lived to grow up because they could not survive in the struggle for existence. Now they are cared for to some extent and often reach the stage of sexual maturity where they can reproduce their kind. One careful statistical investigation concludes that in about thirty years there will be a 24 per cent increase in the mentally deficient and a reduction of 35 per cent in the mentally superior if things go on the way they are now.[14]

There have been no efforts to breed feeble-minded or geniuses experimentally at the human level. Something analogous to this, however, has been done with white rats by Tryon. He used the rapidity with which they could learn a maze as an indication of intelligence. He selected rats which did very well in the maze and mated them, and selected others which did very poorly and mated them. The second generation was run in the same maze and again the best ones bred with the best ones and *vice versa.* After eight generations there were two colonies which scarcely overlapped at all in their ability to run the maze, in other words, the best one of the feeble-minded rats was inferior to the worst of the geniuses. This shows that breeding for brains can be done and throws some light on human eugenics.

---

[12] Dayton, N. A., "Influence of Size of Family upon the Characteristics of the Mentally Deficient," *American Journal of Psychiatry,* 1935, 91, 804.

[13] Brugger, C., "Die Fruchtbarkeit der Eltern von Erblich Schwachsinnigen von der Normal Begaten," *Zeichschrift Gesamte Neurologie und Psychiatrie,* 1936, 156, 752–760.

[14] Cattell, R. B., "A Study of the National Reserve of Intelligence," *Human Factor,* 1937, 11, 12–13.

Inheritance of mental disorder. Somewhat the same trend is found with mental disorder as with mental defect. The situation is complicated, however, by the fact that mental disorders have a predisposing and an exciting cause—the former frequently being heredity, and the latter some stress in the environment which touches off the potentiality. If everyone who inherited the potentiality had it precipitated by some environmental cause, the statistics would be more crucial. However, many persons with the potentiality manage to lead a sequestered life or do not encounter a situation which brings out the disorder.

Some of the data cited in Chapter 14 which covered situations in which patients with a mental disorder were studied with reference to the proportion of relatives who had the same disorder are significant. The difficulty among the relatives was larger than would be expected by accident. However, there is some doubt as to whether the predisposition to disorder is as specific as schizophrenia or manic depressive. It may be, rather, that one inherits a general tendency toward instability which can be touched off by the appropriate exciting cause. Studies of the incidence of mental disorder among twins point in this same general direction. Some psychoses appear to be due to traumatic reasons or are definitely physiogenic in nature, but even here one cannot always be sure. In delirium tremens, for example, it may be that the alcohol is merely the exciting cause that touches off the difficulty which was there potentially, or it may be an outright cause which would have produced that result with anybody.

There have been efforts to cast the predisposition to insanity into a Mendelian pattern. It is suggested that it acts much like the Mendelian recessive, but a categorical conclusion on this point is of doubtful validity because of the complication regarding predisposing and exciting causes.

Eugenic methods. The implication of the foregoing discussion is that something could be gained by decreasing the breeding of mental defectives and persons with potential mental disorders. This should contribute indirectly to the reduction of crime. One obvious procedure is regulating marriage, so that persons with these potentialities are not permitted to marry. There are, to be sure, laws forbidding the marriage of inmates of insane asylums, but as a practical matter church and state will marry almost anyone. Although it is contrary to statute to marry a child of ten, there is no regulation against marrying a person with a mental age of ten. Of course, many of these marriages are annulled later, but frequently some damage is done before that. There have even been misguided efforts to induce feeble-minded persons to marry in order to save the legitimacy of some prospective feeble-minded offspring, thus opening the way for more offspring of that sort.

Normal persons who have some ancestral history indicating mental disorder may have sufficient insight to use good judgment anyway. Some persons of this sort deliberately avoid marrying someone else whose ancestors have a similar complexion. Such a practice would certainly be better than inbreeding those with the unfortunate potentialities and might tend to weaken the recessive tendencies ultimately. There are agencies which will give interested individuals the best available scientific advice on probability of offspring with various disabilities as well as various positive characteristics.

With reference to the defectives, however, and some of the mentally disordered where the exciting cause has already become effective, the regulation of marriage is insufficient prophylaxis. In such instances, segregation is a possibility. This, normally, requires institutional commitment and ample supervision and is quite expensive. If adequately handled, it would take care of the problem as far as the present point is concerned, and in the course of time, the number of patients and the cost would decrease. In institutions the higher types of patients can be made partially self-supporting, but at best it is quite an expensive method and requires everlasting alertness.

The procedure that is more universally practicable is surgical sterilization. In men, particularly, it is a very minor operation. It involves no ulterior symptoms that are harmful and does not affect the individual's sex life. It does, however, take care of the hereditary aspect. This method has been the subject of much controversy. There are those who argue against it because of religious scruples, and others go to the opposite extreme and propose to be altogether too rigorous in such a program. Laws regarding sterilization have been adopted in certain states, and the constitutionality of such laws has been established by the Supreme Court of the United States. It was in connection with one of these cases that Justice Holmes made his famous aphorism that "three generations of imbeciles are enough." Laws dealing with the problem naturally should be very carefully administered. They could be made political capital or reflect personal prejudice. It would be well to begin with conservative standards and, as science discovers more about the potentialities, the scope for sterilization might be extended. It does have the advantage that the patient need not be so carefully supervised or segregated, and as an empirical fact it has not, as some feared, increased sex delinquency. In California about 1,000 women who had been sterilized were investigated, and only 2 to 3 per cent were considered a social menace and about half were making a good adjustment in the community.[15] Thirty states now have laws on sterilization, and in California alone some 12,000 insane and feeble-minded patients have been operated upon.

The implications of this discussion are obvious. It has been shown that mental defect and, to some extent, the potentialities of mental disorder have an hereditary aspect. It has further been shown that mental defect and mental disorder involve certain characteristics which render one more apt to become delinquent. Thus, if the heredity is controlled through sterilization or other measures, it should be possible to cut down the incidence of mental defect and mental disorder and thus, to some extent, the incidence of crime. This is by no means a panacea for crime but should take its place along with other preventive measures.

Control of Sources of Suggestion

Associates. Criminal suggestion received from associates or media of publicity should be eliminated or minimized, from the preventive aspect. If a group can be given something to interest them and keep them away from minor delinquencies, there is obviously less unfortunate suggestion available to influence a new member of the gang. Efforts to keep the youngsters off the streets are a commendable contribution along this line. Such efforts may involve agencies such as Boy's Clubs, recreational facilities provided by such clubs or by the school system, or organized athletics. In short, the solution often consists of providing interesting and legitimate activities for many of these youthful groups whose members often get into trouble because everyone is bored for lack of something to do.

Newspapers. Many persons get the idea of crime, which is tantamount to suggestion, from press accounts. It is neither feasible nor desirable to eliminate crime news completely from the press. This would emasculate the newspaper, and if the elimination included all types of questionable social behavior, there might be very little news left, and no one would buy the paper. There have been, however, plausible suggestions of some legal quantitative control of crime news. A typical bill introduced in a state legislature would reduce the accounts of murders to one-column width and 36 point headlines. There have been instances where a paper voluntarily kept crime news from the front page, but they were papers with a very select clientele. Hoi polloi would not purchase a paper of that sort. The public ought to know something about what is going on and not be given the impression that all members of the community are following the straight and narrow path: this is the head-in-the-sand policy that, on an international scale, leads to war. On the other hand, it is possible to give some different emphasis to the publicity about crime. It is not necessary to present so much detail and know-how. After all, the important thing is that the crime was committed, that the police are working on it, that the offender has been apprehended, and that retribution is overtaking him. Publicity regarding crimes often is justified because it carries to the reader the suggestion that crime does not pay. All too frequently, however, this aspect is minimized, and the actual suggestion that lingers is one regarding the glamour of the whole procedure. A little more stress on the actual incarceration or execution would be worth while. Furthermore, it is not necessary to have so much repetition of details as sometimes occurs. During a trial, the same facts may be presented day after day, making the suggestion more effective by the sheer force of repetition. Although nothing drastic can be done about this particular source of suggestion, it is feasible to tone it down and shift the emphasis.

---

[15] Popenoe, P. and Fenton, N., "Sterilization as a Social Measure," *Proceedings, American Association of Mental Deficiency,* 1936, 41, 60–70.

Magazines and books. It would emasculate magazines and books and such literature to remove the crime motive altogether, but here again, the emphasis could be shifted somewhat, the criminal and his behavior could be portrayed in less attractive fashion, and more stress might be given to the retribution aspect.

Moving pictures. It should be possible to dispense with some of the criminal detail in the movies. The plot would not suffer greatly by omission of the close-up showing just how the criminal got through the jewelry store window. The important thing from the standpoint of the scenario is that he did get in, and the burglar's manual part of it could be omitted. It would be salutary to devote a little more time to the punishment aspect which normally is brushed off in a few seconds at the end of the reel. The audience might have the unpleasant aspect emphasized enough so that they would feel that the misconduct was not worth while after all. The posters announcing the moving pictures merit a bit of attention too. Frequently, they lift from the scenario some bit of gun-play or an over-done love scene which, when isolated from its context, probably has more suggestion than it does in the actual presentation.

Control of Drugs

Narcotic enforcement. The most serious area in which drugs contribute to crime is with reference to the narcotics. One obvious remedy is to decrease the availability of such drugs, which is a difficult program. For one thing, the business is quite profitable because the addict will pay any price, even though he has to secure the money by illegitimate means. Similarly, those who handle the drug traffic will go to considerable lengths in order to deliver their product because of the high profit involved. The other complicating factor is the physical one of the small size of the drug which makes its discovery difficult. A very appreciable amount can be concealed under a postage stamp. Small but potent quantities can be hidden in the hand or in clothing. Small packages concealed in larger shipments of something else constitute a needle in the haystack. Thus, a large and highly trained staff of drug enforcement people is needed. Inasmuch as many narcotics are imported, detection at the ports of entry is very much in point, for there are ingenious devices for smuggling such a small product. Something can be done, too, in the way of securing international cooperation in preventing shipment from the foreign port.

In this country no systematic attention is given to the addicts themselves except in so far as they come in conflict with the law when they are sent to some correctional institution—possibly one designed especially for addicts. There are places where the licensing of addicts has been tried. In Formosa at one time addicts were licensed and if they were properly certified, they were issued a certain quantity of the drug. The drugs were then made as inaccessible as possible to non-addicts, and it is reported that the amount of addiction was reduced by about 80 per cent.[16] Presumably, giving the actual addicts a moderate amount through regular channels took the profit out of the underground business and lessened the probability of new addicts being created.

Long sentence. A minor remedial possibility is to have the courts give addicts as long a sentence as the law allows, not so much with a view to punishing them more severely, but in order to give a longer period in which to wean them from the drug. It takes more than a few weeks to do this if the weaning is to be permanent, and it has been suggested that at least a six-month sentence would be desirable for this purpose, even though the offense was not a very serious one. Unfortunately, the narcotic is often smuggled in to the incarcerated addict, and he may share it with other prisoners who seek relief from their deprivations and perhaps become addicts in this way themselves.

---

[16] Lindesmith, A. R., "The Drug Addict: Patient or Criminal," *Journal of Criminal Law and Criminology,* 1941, 31, 531–535.

Education. An educational program could forestall some cases of drug addiction. Those who begin using a narcotic purely for social purposes or out of bravado might hesitate if they were aware of the possible consequences. If they knew what was ahead, they might not try the drug even under the inducement of their friends. Most addicts, if they could have foreseen the results, probably would not have taken to drugs deliberately.

Alcohol. The psychologist has no panacea for crimes due to alcohol. One possibility would be to give a modicum of education on the undesirability of getting into certain situations such as driving when under the influence of alcohol and the value of moderation. Emphasis might be given to the fact that the subjective feeling of greater efficiency under alcohol is illusory.

Punishment and Crime Prevention

Deterrent effect. A major function of punishment as administered through the law is its deterrent effect. It tends to keep people from questionable behavior through fear of the consequences. This is not putting the voluntary control of conduct on a very high ethical plane, but the fact cannot be ignored. Most persons occasionally have had the impulse to commit some crime or at least to engage in some form of reprehensible conduct, but have refrained because of the probable consequences. It does not strain one's imagination to picture what would happen on the highways if no law enforcement officers were patrolling them. Hence, the fear of punishment may be considered as an appreciable factor in crime prevention.

If this deterrent effect is examined a little more closely, it develops that there are two aspects of punishment involved—its severity and its certainty. Some persons are deterred primarily by the severity of the penalty, and others by the certainty of its enforcement. This fact has been demonstrated experimentally.[17] A group of subjects were supposed to imagine that they were going to commit a crime with the option of committing it in any one of ten states. In the first state the penalty was only a ten-day commitment to prison, but there was absolute certainty that the penalty would be inflicted. In the next state the penalty was one month and the chances 90 out of a 100 of getting the penalty. In other states there were various combinations of severity and certainty ranging down to a penalty of life imprisonment with the chances only 1 in 100. The subjects were asked to indicate in which state they would prefer to commit this crime and to rank all ten states in order of preference. The results appear in Table 23. The successive rows give the different penalties and the successive columns first choice, second choice, and so on. Reading across the first row, for example, the ten-day penalty with absolute certainty was selected by 16 per cent of the group as first choice, by 2 per cent as second choice and so on, with 18 per cent selecting it as last choice. In the bottom row 16 per cent put life imprisonment as first choice, 4 per cent as second, and 58 per cent as last choice. The table indicates that for the light penalties with high certainty the choices concentrate at either one extreme or the other. Going down the rows as the penalties increase but the certainty of enforcement decreases, the figures tend to fall in the middle ranks, and toward the bottom of the table they begin to divide again and cluster at the extremes. If the penalty alone had been the main deterrent for everyone, the figures would decrease when descending the first column. It is obvious from the table that some are deterred by the severity and some are deterred by the certainty, with some persons apparently in between. The same trend was shown in another experiment where the hypothetical situation involved only five situations ranging from ten days and 100 per cent down to one year with 20 per cent.[18]

---

[17] Poffenberger, A. T., *Applied Psychology*, page 503. New York: D. Appleton, 1927.

TABLE 23

Deterrent Effect of Penalties *

		Choices									
Penalty	*Certainty*	1	2	3	4	5	6	7	8	9	10
10 days	100/100	16	2	6	6	18	14	4	4	12	18
1 mo.	90/100	8	26	4	8	4	8	6	10	24	2
3 mo.	75/100	2	6	30	10	6	10	6	26	2	2
6 mo.	66/100	8	14	10	22	16	0	28	2	0	0
1 yr.	50/100	10	8	10	14	24	28	2	2	2	0
2 yrs.	25/100	8	4	12	8	32	28	0	0	2	6
4 yrs.	12/100	6	12	4	24	8	6	32	4	4	0
8 yrs.	6/100	8	6	18	2	6	8	8	42	2	0
16 yrs.	3/100	1	18	2	2	2	8	10	4	46	2
Life	1/100	16	4	2	4	2	4	2	2	6	58

* Hollingworth in Poffenberger

---

[18] Durham, J. S., *Certainty versus Severity of Punishment.* M.A. Thesis, Columbia University, 1925.

It is probable that some crimes do have penalties which are sufficiently severe, but persons take a chance because they realize that they have a fairly good opportunity to escape punishment. In homicide, for instance, it has been estimated that although the penalty is severe, only one out of three offenders get caught, one out of twelve convicted, and one out of one hundred executed. If 99 out of 100 were executed, many more would be deterred. To be sure, there are the anecdotes about pickpockets operating in the crowd that was witnessing the hanging of other pickpockets in England; but figures are lacking. It may well be that the *probability* of being caught was quite small in this case. The following instance illustrates the effect of a change in the severity of the penalty. In California at one time thefts of more than $50 were grand larceny and a felony. Some youngsters who stole autos merely for joy-rides might thus get from one to ten years, which seemed a little severe for them. Finally, the law was revised for the benefit of these juveniles so that taking an auto temporarily could not draw over three months; thereafter, auto thefts picked up very materially.[19]

Another case involved a man who committed murder in California and got across the line into Canada. Later, he was wanted in Canada for highway robbery but escaped back into California. The California police picked him up, and he was to be tried for murder. However, the Canadian authorities wished him extradited to face the highway robbery charge. He actually fought the extradition, preferring to stay in California and face murder rather than go to Canada to be tried for highway robbery. This has obvious implications regarding the penalties and the certainty of enforcement in the two regions.

Thus, if puishment is to be an effective deterrent, it is necessary to have fairly severe penalties and to enforce them rigorously. If the penalty alone is increased, some individuals will gamble on their chance of escaping. Rigorous enforcement of a mild penalty will not impress some individuals who would be willing to pay a heavy fine and continue the same lucrative racket.

Reformation. Merely incarcerating the individual for a term is not enough to insure that he will go straight in the future to avoid further punishment. He may simply devote this period of inactivity to figuring out how to be successful the next time. Some positive effort may well be made to reform him during his sojourn "inside" so that he will have a different point of view or in other ways be able to make a better social adjustment when he is released. Unfortunately, there are often negative influences in the prison environment that tend to make the offender worse rather than better. These influences have been called "criminal infection." A casual type of criminal who has committed his first offense may be thrown in with a group who have been there before and may learn a lot of undesirable things from them. The standard way to open a conversation with a new cell-mate is, "What are you in for?" This leads naturally to a discussion of their various offenses and perhaps the mistakes that they made. Many a first offender goes forth to pursue other crimes, the techniques of which he learned from companions in the penitentiary.

---

[19] Killick, V., "Severity of Punishment as a Deterrent to Crime," *Journal of Delinquency*, 1927, 11, 39–45.

Some investigation has been made of this factor by measuring attitudes and personality during incarceration. The Kent-Rosanoff association test was used in one such study. This is a list of words to which the subject responds with the first association that occurs to him, and any atypical responses are noted as of particular significance. Moreover, in this instance the subjects gave a manual response (Luria), pressing a pneumatic key synchronously with the oral response. Unusual patterns in the manual response are also significant of emotional disturbance (page 330). This test was given to some prisoners at the beginning of their terms and after six months at the institution, and to another group that had been there eighteen months. There were statistically reliable differences to the effect that the longer the stay, the more the responses resembled those of psychoneurotics and confirmed delinquents. In other words, the trend was toward more conflict, and emotional difficulties.[20]

There have also been efforts to get prisoners to express their opinions about punishment, parole, and so forth. In many cases these data are worthless because some questions were leading or because the respondent may hesitate to give a true answer for fear the facts would be used against him in some way. In one instance, however, anonymous questionnaires were used, and fairly good rapport was obtained with some of the prisoners who then became willing to secure information from others. The investigator was interested in their general attitudes, and these attitudes were distinctly unfavorable on the whole. Most of them felt that he prison itself had no beneficial effect. They hated the guards, and there was a general belief that every man has a racket.[21] These results are none too encouraging for the effect of punishment on the offender. They might relate to a finding cited earlier that 88 per cent of 1,000 juvenile delinquents had some further delinquency within a five-year period.

All this indicates the desirability of offsetting some of the negative influences of punishment by a more positive program. One consideration is to take care of the leisure time which the inmates have. If there is nothing much to do, prisoners are apt to discuss crimes and get ideas and plans for future criminal activity. Recreation or other avocational pursuits which would take up spare time is very much in point. Vocational activity serves the same end and also has ulterior value. Many an ex-convict has subsequently made good in some trade which he learned while in prison. If the vocational assignment at the institution is based on analysis of the individual and a modicum of vocational guidance, so much the better. Perhaps, in this way, the man will discover a suitable vocation for himself and become skilled at it so that he can make a more adequate vocational adjustment outside. This may go a long way toward keeping him out of trouble because if he is successful from the vocational and economic standpoints, there is less motive to finance himself in illegitimate fashion.

---

[20] Kephart, N. C., "Some Changes in Delinquents During Institutional Commitment," *Journal of Juvenile Research,* 1937, 21, 67–76.

[21] Rasmussen, D., "Significant Attitudes of Prisoners." Paper read at the American Sociological Society, Philadelphia, 1939.

Another constructive feature is a little counseling and planning with the individual before he is to be released. In most cases a sentimental approach is not successful, but if the individual is even mildly interested in adequate adjustment, it is possible to help him in making plans. There is always the danger that when he is released he will drift back into some of his old haunts and get into trouble again. This may be forestalled by helping him make definite plans for when he gets out, not merely for what kind of job he will have, but for what he will do in his spare time. It is not a bad idea to outline in considerable detail his actual daily program and to help him budget all his waking hours for an initial period at least. If he carries out this budget, time will not hang heavily on his hands and he is not likely to get into trouble through *ennui.*

Mention should be made in this connection of special institutions designed to promote the rehabilitation of the offender. Forestry camps for youthful offenders, for example, have been successful in improving morale and awareness of social responsibility. Almost any institution for juvenile delinquents, if adequately financed, can adapt its program to the best interests of the youngsters.

Flexibility—more individualization of punishment—is another contribution to the reformatory aspect of punishment. This is involved to some extent in the case of mentally defective or insane offenders where the prognosis is obviously atypical, and the penalty may be varied accordingly. Flexibility in the way of parole, or probation, or indeterminate sentence facilitates this individual type of adjustment. If it appears that a minimum length of time would straighten a person out, nothing is gained by keeping him in longer. On the other hand, if the prognosis is unfavorable, and nothing constructive can be done, it may be desirable to keep the offender out of circulation as long as possible and delay the further offenses that are inevitable. There are empirical indications of the value of the parole system. A study of 149 prisoners and 275 reformatory inmates who were paroled indicated that 50 per cent were successful in the sense that they did not get into further trouble.[22] The psychological aspect of the problem deals with the techniques used in determining who shall be paroled. The general method involves comparing available psychometric and biographical data for a group of persons who were paroled and who were successful with a group of parolees who were not successful. Items which show appreciable correlation with parole success may be weighted statistically by accepted procedures to get the best possible correlation of the weighted sum of the items with parole success. One such study included among the significant variables intelligence tests, a psychological prognosis test, personality, and a record of previous commitment. The correlation with parole success of these weighted items was .41.[23] In a Pennsylvania penitentiary predictions made by the psychological staff of the institution correlated with actual outcome of parole to the extent of .71. This correlation was based on psychological tests and interviews with 120 cases.[24] Another study of twenty-eight adults yielded reasonably satisfactory results. The best predictors were employment during probation, continuation of previous type of job, residential stability while on probation, marriage status, absence of previous criminal record, type of occupation—with proprietary or skilled most favorable—age, and ownership of property.[25] It has been suggested that variables like these might actually be used in helping the judge decide upon the initial sentence. Some parole boards have tables using these and similar items to facilitate prediction, and such tables might be useful to a forward-looking court that wished to individualize sentences as much as possible according to the prognosis. A somewhat related practice is that followed by some surety companies in estimating the honesty of people to whom they lend money. This, of course, is prior to any delinquency but is an analogous problem of predicting socially acceptable conduct. A good deal of their analysis is based on what the client will be up against. If, for example, he is in financial straits, he is more likely to get into trouble than if he is getting along reasonably well. They usually go back ten years in his record, and if everything is well accounted for, the prognosis is favorable. They investigate the places he has worked, and the number of persons he supports. Married persons are a better risk because they do not want to disgrace the family. Too large a family, however, increases the economic problem and thus the temptation to do questionable things. They find that persons living in a small town are better risks because they have less temptation and are also less able to cover up. Those of higher educational standards are preferable, perhaps, because they know that questionable financial practice is unprofitable in the long run.[26]

---

[22] Sampson, L. W., "After-Careers of 424 Paroled Wisconsin Criminals," *Journal of Criminal Law and Criminology*, 1934, 25, 607–620.

[23] Borden, G., "Factors for Predicting Parole Success," *Journal of Criminal Law and Criminology*, 1928, 19, 328–336.

[24] Carter, A. C. and Giardini, G. I., "Reliability of Psychological Prognosis in the Western Penitentiary of Pennsylvania," *Journal of Criminal Law and Criminology*, 1935, 26, 556–560.

[25] Gillin, J. L. and Hill, R. L., "Success and Failure of Adult Probationers in Wisconsin," *Journal of Criminal Law and Criminology*, 1940. 30, 807–829.

Protect society. One other aspect of punishment is that it serves to protect society from dangerous individuals. For example, a sadist is incarcerated for having committed a crime of violence. There is every expectation that he will do the same thing again when he has an opportunity. His imprisonment will at least keep him where he cannot harm other people. To be sure, he belongs in an institution for the mentally disordered, but barring that, he should be any place out of circulation. Unfortunately, legal procedure does not always take this point of view. There are cases in which insane or defectives are sometimes turned loose in society by means of legal manipulation.[27] For example, a very unstable private in the army became unduly negligent and presently went with a loaded weapon to find a soldier who owed him two dollars. Then he was called in by his Captain for over-staying a pass and, when dismissed, killed the Captain and wounded two other men who interfered. He then developed a delusion that the Captain was not dead. Later, he was committed to a hospital for the insane. His relatives finally managed to have him transferred to a hospital nearer home. While he was passing through an intervening county, he was met by the sheriff with a writ of *habeas corpus,* and the court discharged him because he had not been judged insane in that county. In this way a dangerous individual was turned loose in society. It is to be hoped that his relatives kept him adequately supervised, but there is a good chance that he is likely to break loose on occasion. Punishment by imprisonment does have this occasional function of keeping a dangerous individual where he cannot harm other people.

---

[26] Kelley, F. C., "They'll Bet You're Honest," *American Legion Magazine,* February, 1934, pages 4 ff.

[27] White, W. A., *Insanity and the Criminal Law,* pages 107 ff. New York: Macmillan, 1923.

Education

Out of mischief. A final consideration in crime prevention in its psychological aspects is the possible contribution of the educational system. One contribution that doubtless may forestall some juvenile delinquency is simply keeping youngsters out of mischief by compelling them to attend school several hours daily. It has been noted in other connections that idleness is conducive to misbehavior. The typical individual who has nothing to do hangs around looking for trouble and usually finds it. Quite apart from the ulterior values of the school program, it does occupy six hours or so out of the day and there is that much less time available for delinquent behavior. This contribution may also extend beyond school hours if the playground facilities are made available. In many crowded districts recreational facilities are severely limited, but the school may make its yard and even some inside equipment available for extracurricular activity.

Vocational education. Some schools help in training people for specific jobs, which raises the moot question about cultural *versus* vocational objectives for the educational system (page 187). In almost any school system there is a modicum of training which may be of vocational significance—manual training, or home economics. Without re-opening the controversy, it may be pointed out that in so far as the educational system does equip the individual for a more successful career it is rendering him less likely to follow a delinquent career because of unsatisfactory vocational adjustment. If a person gets into a type of work for which he is well fitted, in which he can make good, and in which he is interested, he will probably be able to finance himself all right as well as be reasonably satisfied with his work. If a pupil in school has received some vocational training or skill that will stand him in good stead in a subsequent vocation, he is more apt to secure a good job and be successful therein, which decreases the probability of delinquency.

Vocational guidance. There is a more basic problem of vocational guidance. After all, a person can get his vocational training on the job, but if he lands in the wrong job, no amount of training will make him well-adjusted. An earlier chapter discussed vocational guidance at some length, indicating the importance of aptitudes, experience, interest, and opportunities. It was noted that even in penal institutions some guidance is possible in connection with vocational assignments. Such guidance during school days would be still better from a prophylactic standpoint. The modern school often does much in the way of vocational guidance with skilled counselors who devote their time to this specific objective.

If a person gets into the right job, he is well-adjusted, happy, and effective, and if he gets into the wrong one, he may be frustrated and seek other sources of satisfaction. In so far as the school implements these vocational choices it is contributing to better adjustment and less delinquency.

Summary

It is possible to discover potential delinquents in advance of any actual offense to some extent. Inasmuch as mentally defective and mentally disordered individuals are more inclined to get into trouble, it is desirable for their relatives to have sufficient insight to secure expert help before they reach the dangerous stage. Police departments may do well to watch chronic complainants or persons who are being "persecuted." School retardation or intelligence tests given in the school system should help locate defectives who may become delinquent. Early delinquency is often prognostic of later criminality.

Eugenics can make some contributions to crime prevention. There is clear evidence that intelligence is hereditary and this applies to the low end of the intelligence scale too. A very high proportion of feeble-minded children is found when both parents are feeble-minded. Moreover, feeble-minded stock appear to be more prolific, which accentuates the problem. With lower animals it has been possible to breed a more intelligent or less intelligent stock.

With reference to mental disorder, the hereditary situation is similar but complicated by the fact that an exciting as well as a predisposing cause is involved. The individual may inherit the potentiality but never encounter a situation which touches his disorder off. Even so, there is fairly definite evidence that mental disorder runs in the family. Inasmuch as the mentally disordered and mentally defective contribute more than their share of delinquency, it is obvious that if there were fewer such persons there would be somewhat less delinquency. Eugenics is one answer. Marriage laws might help somewhat but often are insufficient protection with persons of this type. Segregation of the sexes is satisfactory but expensive. Surgical sterilization is the most practical solution and has already demonstrated its effectiveness in some states.

Since suggestion received from one's associates or from various media of publicity is an appreciable source of crime, the obvious prophylactic measure is to minimize those sources. As far as associates are concerned —and this is especially true for juvenile delinquents—it is desirable to provide wholesome things for the youngsters to do by arranging facilities for recreation and athletics. With reference to the press, many persons get the idea of crime from reading about it. Although it is inadvisable to eliminate crime news altogether, such stories might be played down in terms of actual space, less information might be given as to the actual techniques followed by the criminal, and more stress might be laid on punishment rather than the interesting aspects of the criminal's career. Similar principles would apply to magazines and books. The moving pictures present much the same problem. It is possible to show exactly how the job was done with such facilities as the close-up; this could be omitted without much damage to the continuity. Often the criminal is portrayed with a fictitious glamour whereas more emphasis might well be given to the retribution which overtakes him.

The most serious drug problem from the crime standpoint centers around narcotics. The addict will go to any extreme in order to secure the drug. Therefore, the narcotic business is profitable, and, moreover, the product itself is so small that detection is difficult. Adequate prevention thus requires a large and competent force. Courts might well assign long sentences to drug offenders in the hope of weaning them from their addiction. Education of youngsters prior to any contact with the drug might forestall some addiction by showing them the dangers of indulging for social purposes. Education on the undesirability of getting into certain situations while under the influence of alcohol should be helpful too.

Punishment contributes substantially to the prevention of crime through fear of the penalty. This deterrent effect, however, has two aspects: the severity of the penalty, and the certainty of its enforcement. Investigations of attitudes regarding these reveal that some people are deterred primarily by the severity, some by the certainty, and many respond moderately to both. This means that if a deterrent program is to be successful, it should stress both aspects and not only impose severe penalties but have them rigorously enforced. Another important aspect of punishment is the possibility of reformation during incarceration. All too frequently there is criminal infection, and the offender comes out worse than when he went in and may pursue crime as a career where originally he was only a casual criminal. Tests of personality and emotional factors have revealed the unfavorable effects of prison life. These negative aspects of incarceration may be offset somewhat by better provisions for leisure time along vocational or recreational lines. Moreover, a little counseling and planning with the individual at about the time of his release is helpful. If he goes back into his previous environment, he may slip into the old habits unless his time is well accounted for and even budgeted. It will be helpful, too, if the program of punishment involves a certain degree of flexibility so that the court may take some cognizance of the prognosis in the individual case. It is possible to predict parole success on the basis of biographical and psychometric data with some degree of success. One other function of punishment is to protect society from the dangerous criminal who may repeat on the first occasion.

The educational system helps reduce crime by keeping the youngster out of mischief during six or more hours of the day. Some schools, moreover, do quite a bit in the way of vocational education so that the person's subsequent vocational adjustment and resulting financial status is more apt to be adequate. Vocational guidance has even more important contributions to this same end.

16

PSYCHOLOGICAL TESTS IN EMPLOYMENT

THUS FAR OUR discussion has dealt with the application of psychology to problems of education, medicine, law, and criminology. We turn now to a final field of major application—business. This field immediately subdivides three ways: first, employment—getting the right man on the right job; second, industrial efficiency—enabling the worker to realize his maximum effectiveness after he has been selected; third, marketing the product once the properly selected and efficiently operating worker has made it.

The present chapter will be devoted to the use of psychometric procedures or psychological tests in selecting or screening applicants; the following chapter will deal with other predictors such as rating scales, interviews, and personnel records. The importance of scientific selection of employees needs little elaboration. The worker who is in a job to which he is not adapted cannot produce adequately and may be unable to support himself if he is paid by piecework. His morale may suffer because of this, and he experiences frustration when he observes others performing much more effectively than he does. Matching the aptitudes of the worker to the requirements of the job is thus a basic consideration. The vocational guidance approach, which was discussed in Chapter 8, dealt with one individual and a lot of jobs, whereas the present consideration is one job and a lot of applicants. Many of the basic principles are the same, but we are looking at the problem, as it were, from opposite ends. In both instances the aptitude, interest, and experience of the individual have obvious relationships to the desirability of a given type of work. In vocational guidance those characteristics of the person are evaluated as related to the various possible occupations in which he might have a career, whereas employment psychology analyzes a job to ascertain what characteristics are necessary and then determines which applicants have those characteristics.

At this point we should recur to distinctions made in Chapter 4 (page 66) between different types of psychological tests. The first division is on the basis of aptitude or capacity tests on the one hand and proficiency or achievement tests on the other. The former involves potentialities and includes both general capacity tests (intelligence) and special capacity, or aptitude, tests (reaction time, judgment of distance, attention, memory for numbers, and so forth). The latter involves characteristics which have definitely been acquired; the principal type used in industry is the trade tests.[1]

Basic Principle of Test Validity

A basic consideration in vocational adjustment is matching the potentialities or aptitudes of the individual to the requirements of the job. An employment department may have a good idea that a certain job requires dexterity and quick reaction time, but it cannot tell by looking at an applicant whether or not he possesses those characteristics. Tests become useful in this area because they are designed to measure such aptitudes. True, other sources of information may point to dexterity, reaction time, or intelligence without any tests. If the applicant has accomplished three years of successful work in watch making, it goes without saying that he has considerable dexterity. If he made an enviable record on the fencing team in college, he certainly must have quick reaction time. A very high academic record points inevitably to high intelligence. If the employment interviewer is fortunate enough to have information of this sort, he may not need so many tests. However, he should be cautious in the employment situation about accepting the clients' statements about personal accomplishments at face value. After all, the applicant for a job is attempting to make the best impression and sometimes to secure the job at all costs. The client who comes for vocational counseling is more apt to give reliable answers with no tendency to exaggeration.

Assuming that tests are to be used, the question immediately arises as to which tests to employ in a specific situation. Obviously they should be tests that will make it possible to *predict* what the applicant will do on a particular job. This ability-on-the-job variable is technically termed the "criterion," so what actually is wanted is a test which has a high correlation with the criterion. The magnitude of this correlation indicates what is called the validity of the test. Two kinds of test validity may be distinguished; *a priori,* or face, validity and empirical validity. The former is based essentially on intuition or, at least, on the best judgment which one can make without any actual experimental work. If workers on a job manipulate small delicate materials, and a test is devised in which the subject is required to manipulate small pegs with a pair of tweezers, it might be assumed that the test would be useful in selecting workers for that particular job. This assumption constitutes the face validity of the test. It is, however, much more scientific to proceed in empirical fashion: give the test to a group of workers whose ability on the job is known, and correlate their test scores with the criterion statistically, which yields the empirical validity of the test. All the better employment test work relies on empirical rather than on face validity.

---

[1] For a general reference on employment psychology see Burtt, Harold E., *Principles of Employment Psychology.* New York: Harper's, 1942.

It should be added immediately that the psychologist in the employment department does not devote himself exclusively to selection. He may, on occasion, counsel an employee who is dissatisfied with his present assignment about profitable directions of transfer. Or perhaps an applicant is not suited for available job openings but it is obvious from the employment interview and tests that he has a good chance of a successful career in another line; the employment psychologist has a social responsibility of telling the applicant about these other possibilities. Where there are several available jobs in any one of which the applicant appears likely to succeed, the employment man should give some consideration to what is best for the applicant himself. Some firms have the policy of hiring certain employees not so much because of the needs in a specific job but with the expectation that after a year or two of orientation, varied experience, and subsequent training, they will carve out careers for themselves in some phase of the enterprise. The employment man has a continual responsibility in vocational guidance for such persons. A large telephone company although it was not hiring any college graduates in the middle thirties, retained a high salaried personnel man to correspond with, and interview, them in a vocational guidance capacity. He made an effort to help them find themselves and get started in suitable careers in spite of the depression. The concern obviously was attempting to rise to its social responsibility, and of course it was building good will from the long-term standpoint.

Types of Aptitude Tests

Nature of tests. The aptitude test is one of the most important tools of the employment psychologist. He resorts to psychometric procedures by preference, because they are more objective and quantitative than other predictors. A test is a sample of behavior. It is impossible to measure an entire function like attention or memory, but it is necessary to sample it. The problem is analogous to that of a manufacturer buying a shipment of wool or a supply officer inspecting a carload of grain, where it is impossible to evaluate every pound in the shipment. The usual practice is to take a few samples here and there, examine them, and then assume that the entire carload is like these samples. By the same token, the ability to concentrate for a few minutes on the test blank is regarded as a reliable sample of the person's ability to concentrate for a prolonged period in his daily work, or the average speed with which he can press a telegraph key in response to a visual stimulus is taken as indicative of his usual speed of reaction when he is driving through traffic.[2]

Justification of terminology. It is common practice to designate aptitude tests by names such as attention tests, memory tests, intelligence tests. This does not imply, however, that such clear-cut categories exist in a fashion which can be measured exclusively by a particular test. The average psychologist is not positive about what actually is meant by "attention" or "intelligence." Regardless of what it is named, the really important point for employment work is the validity of the test: if a so-called attention test has a high correlation with the criterion and makes it possible to select efficient clerical workers, the name of the test is irrelevant. However, in dealing with the layman, it is often better to give a test a plausible name merely to promote his understanding and appreciation of the test program, and also because it helps in securing better rapport with the subject, who likes to know what is being measured, and may cooperate more readily if the test is meaningful to him. Another consideration is that the tests may overlap each other. This overlapping can be discovered statistically by correlating the two tests with each other, but it is well to avoid the implication of measuring something that is entirely independent of all other variables. The psychologist gives tests practical-sounding names with his tongue in his cheek, but his major objective is the validity of the test for a specific purpose. There is no such thing as general validity. It is always a question of validity in a particular situation.

Special aptitude tests. A considerable range of typical special aptitude tests was described in Chapter 8 (page 192). Some of these involved sensory facility of various types, attention, facility in learning as revealed by substitution tests, speed of association, standard memory tests, reaction time, motor control, and so forth. An employment psychologist has in his files an assortment of tests along these and similar lines or at least knows where he can get them if they are needed. On many occasions nothing quite suitable for his problem is available, and he must devise original tests of his own.

---

[2] For listings of a considerable number of tests see Hildreth, G. H., *A Bibliography of Mental Tests and Rating Scales.* New York: Psychological Corporation, 1933; Garrett, H. E. and Schneck, M. R., *Psychological Tests, Methods and Results.* New York: Harper's, 1933; Stead, W. H. and Shartle, C. L., *Occupational Counseling Techniques,* Appendix II. New York: American Book Co., 1940, and catalogues of reputable concerns that market tests.

General aptitude tests. The intelligence test is more general. Although there is disagreement on the nature of intelligence (page 31), the point should be emphasized again that, from the standpoint of employment psychology, the name is comparatively unimportant, but the validity of the test is all important. Some of the tests which are currently termed intelligence tests have found a useful place in industrial psychology. The Binet test (page 68) is none too satisfactory for the average or superior adult and, since it is an individual test, it requires a lot of the examiner's time. In industry it is used mainly for abnormally low-grade applicants or for cases that present some special problem. A psychologist may give an individual test like the Binet and observe the subject clinically while the test is in progress.

Much greater use is made of group intelligence tests (page 71). With printed blanks and alternative-answer items many applicants can take the test simultaneously if they happen to present themselves at the same time. And even if they drift in individually, the examiner does not have to devote every moment to supervision. Typical items described earlier include supplying opposites of words, completing analogies such as "oyster is to shell as banana is to what?" showing insight on problems of what to do under various circumstances, and giving general information. Such tests may be used in locating the employee at his approximate occupational level. For illiterate applicants recourse must be had to performance tests. Some of these were described previously—finding things that are wrong or missing in a picture or locating the odd member in a group of pictures, all but one of which belong to a certain category. There are also individual performance tests of the form board, or picture puzzle, types. Mention should be made again of tests of mechanical intelligence and social intelligence as contrasted with the more usual abstract, or verbal, intelligence test. (Page 74.)

Personality tests. Employment psychologists frequently encounter a situation in which persons with aptitude for a job, as indicated by tests, fail to measure up to expectations, not because of something wrong with the tests, but because of other variables. Perhaps the worker is lazy, or careless, or reckless, or cannot get along with people. These characteristics may be especially important in certain jobs, and a psychometric evaluation of them is desirable. The subject may be asked what he would do if someone crowded in ahead of him in the line at the ticket window or whether he ever is conscious of people looking at him, or he may check, in a list, the things that he frequently worries about. Tests of this sort have been widely used in clinical practice where they prove reasonably satisfactory. They are of doubtful value in employment work because they necessitate too much cooperation on the part of the subject. If he does not come clean in his responses, the test is worthless. In a clinic a person is seeking help on a personal problem and will do his best to cooperate and check the answers that actually describe his feelings and attitudes. He does this in much the same way that he approaches a physician and attempts to describe all his symptoms. In an employment situation, however, the attitude is entirely different. The applicant is after a job and will try to answer the test items in the way that he thinks will secure the job. The following incident illustrates the point. When a department was developing tests for selecting traveling salesmen, it desired to find persons who knew their way around, and could meet sophisticated prospects on their own ground. In order to locate this kind of applicant, an information test was devised that touched on such things as the comparative value of a full house and a flush, the number of spots involved in "Little Joe," or the term applied to short, lively chorus girls. The employment department actually was looking for prospective salesmen who were familiar with such things and would be able to establish rapport with their prospects along these lines if necessary. When the tests were given to some applicants, however, none of them apparently had heard of a "full house" or were acquainted with "Little Joe." They evidently suspected that the employment department was checking up on their moral character and looking for people in the straight and narrow path.

It is for such reasons that the usual *subjective* type of personality test is unsatisfactory for employment work. Perhaps this objection is not so serious with some projective techniques (page 247). It is possible that such tests may be made too subtle for the subject to figure out what is a good answer. If he is trying to read meanings into a series of ink blots, he may be unaware of the complicated scoring method by which they are to be evaluated. However, even here he may suppress certain responses which occur to him if he thinks that they might be socially unacceptable.

At present, however, the industrial psychologist is turning his interest more in the direction of *objective* tests of personality when that characteristic seems to be important. Such tests for honesty and self-control were mentioned briefly, and a test for recklessness was described in Chapter 8, Another such test involved tracing with a stylus through an electric maze so arranged that the longest pathway was the widest (that is, the easiest), and the shortest alternative pathway was the narrowest. The path which the subject chose was indicative of his attitude. An objective test designed to measure tendency to become frustrated employed a large rotating table and several marbles that appeared from under a screen and had to be removed and placed in a hopper in a certain pattern. If the marbles were not picked up within a limited time, they dropped through a hole into the interior of the apparatus. The time available for making the selection was decreased in successive trials until the test became very difficult and mistakes were inevitable. It was thought that there might be some difference between the subjects who still selected the marbles in the correct order as far as they went and the subjects who picked more or less at random when they became emotionally disturbed. In another test the subject adjusted one of two rods in a box, viewed from a distance, until they appeared equidistant to him. He had a limited time in which to make this judgment before the light in the box went out. He also had to squeeze on a small trigger attached to the mechanism he was pulling to keep the light in the box turned on. Actually, this trigger also recorded continuously the amount of pressure being exerted. As the time available for making their discrimination decreased in successive trials, the subjects who were more frustrated by this were inclined to squeeze more vigorously on the trigger.

There have also been efforts to develop this objective type of test in a form that can be administered to a group by means of a printed blank. The subjects are called upon, among other things, to indicate which of two adjectives or nouns best describes them. If the adjectives, for example, are "honest" and "arrogant," the average subject will have little difficulty. However, if both words are favorable or both unfavorable, discrimination is difficult, as for example if he has to choose between "honest" and "intelligent," or between "crook" and "drunkard." The test is aptly named "forced-choice." The important consideration is that the subject cannot figure out what is the best answer from the standpoint of getting the job. The test is analyzed, item by item, to determine if people who are successful in a particular job tend to select a certain alternative more frequently than persons who are unsuccessful. The procedure is essentially determining the validity of each individual item. Little is staked on a single item, of course, but when a lot of items have some validity, the total group is of considerable significance. Many of these objective personality tests are still in the research stage, but they are very necessary for certain employment problems.

Problems in Test Technique

Individual *versus* group tests. We now turn to a number of problems in test technique which have been discussed only incidentally. These problems arise in connection with the development and administration of tests. One problem is whether to use individual tests in which a single examiner sits down with a single applicant, or group tests in which the number involved simultaneously is limited primarily by the seating facilities. In the war it was not uncommon practice for several hundred soldiers to take a test simultaneously. The individual test has certain advantages. For one thing, the examiner is in a position to observe everything the subject does and if anything goes wrong, can correct the difficulty immediately. Subjects often misunderstand even though the printed directions seem foolproof. Again, the individual test in the hands of a skilled examiner provides a "clinical picture" of the subject. The incidental observations made while administering a Binet test are often just as important as the I.Q. itself. It is possible with individual administration to employ a wider range of test performance using instruments or special apparatus where the group test is limited to printed blanks. On the other hand, the cost of individual test administration is an important consideration. If the test program takes roughly one hour per applicant, and fifty applicants are to be examined daily, six or seven examiners would be required for individual test administration, whereas the entire fifty could be given the test simultaneously in one hour if the group procedure was used. Even if all fifty applicants do not arrive simultaneously, many tests designed for the group administration require the examiner merely to start and stop the subject on time, and one examiner can keep track of a considerable number of applicants who drift in irregularly. Some of the advantages of the individual procedure may be maintained by using the group method with comparatively small groups. If a room is available with tables so that a dozen persons can take the test at one time, it is simple for the examiner to move around between the tables, look over shoulders and catch anything that develops in the way of misunderstanding. He can even make some observation of unusual behavior, tremor or signs of frustration.

Types of response. The type of response which the subject makes is determined largely by the nature of the test itself. The alternative-answer form is usually standard practice for printed tests. Each item involves some statement with several alternative responses to that statement from which the subject must select the correct one—for example, "good is the opposite of: little, bad, queer, nice." One advantage of this method is that the answers are unequivocal. In the days when the opposites test involved merely a list of words after each of which the subject wrote the opposite, someone had to decide whether the answer given was satisfactory or not. For the word "good," "bad," or "poor," or "immoral," might be given and it was debatable whether these answers were equally satisfactory and deserved equal credit. In the alternative-answer form the possibilities are sufficiently unequivocal so that only one can be considered correct. Thus two different people scoring the blank get the same result. This also saves time in the scoring, because it is possible to look for the location of the response without reading anything.

Another type of test involves matching certain items. For example, in one of the mechanical aptitude tests, an item includes two series of pictures. On one side is a hammer, a screwdriver, and a wrench, and on the other side is a nut, a nail, and a screw. The latter three are numbered and the subject simply has to place after each of the items in the first group the number of the item in the second group that goes with it, matching the nut with the wrench, and the nail with the hammer. The type of response made in performance tests obviously depends on the mechanics of the test. It may involve pressing a key, putting a peg in a hole, assembling a puzzle, or adjusting levers. The important point is that the subject's response yields an objective score.

Time limit *versus* work limit. Some limitation obviously must be imposed on the subject's responses when taking a test. He cannot work on indefinitely. One possibility is to provide a more than adequate amount of material but let the subject work for a limited time, say ten minutes: this is a time limit test. The other possibility is to have a set amount of material which the subject must complete and see how long it takes him: this is a work limit test. In the former the efficient subject covers more test items than the poor subject. In the latter he completes the test in a shorter time. One factor that often determines the type of limitation to impose is whether individual or group procedure is involved. A time limit is preferable in a group test simply because of the greater convenience in getting the score. If a lot of subjects are working simultaneously, it is simple enough to start them off together and stop them at the same time. The papers can be graded according to the amount of material accomplished. If a work limit is to be used in the group administration, however, it is necessary to record the moment when each individual finishes. It is possible to have them bring their papers to the desk as they complete the test, but a person in the back row might lose fifteen or twenty seconds compared to a subject in the first row, and this additional time really should not be part of the score. If only a few persons are involved, it may be feasible for the examiner to get the time when they finish accurately enough, or if the test rquires half an hour or so, the twenty-second handicap is insignificant. However, in most group testing projects the time limit is used for the reason just mentioned.

There is little to choose between the two methods from the standpoint of reliability. A speed-of-reading test was given both ways. There were two forms of equal difficulty, and the subjects in one series took Form A time limit and Form B work limit, and those in the other series did just the reverse. The correlation between the two methods was .87 and .84 in the two series, which is just as high as the correlation obtained when the subjects took both forms with the same kind of limit.[3] Another point in this connection is the actual determination of the proper limit. The general principle to observe for the time limit is that, with a reasonable amount of material, the time allotted should be such that the best individual will almost, but not quite, finish the test. If the time limit is too long, many subjects will finish, and there will be no way to differentiate between them. A subject who has just barely finished and one who had a minute to spare, would get the same score. On the other hand, if no one finishes more than half the test in the allotted time, the remaining printed material is simply wasted. It is necessary to determine what is a reasonable amount of time which should be devoted to the work limit test, and then provide enough material so that the best subject will require approximately the designated time to complete that material. Less efficient subjects will take longer. These limits can be set after the time required by the average subject for the completion of each item—that is, the item difficulty (page 423)—has been determined.

General precautions in test administration. A few precautions of a general nature are necessary in the administration of tests. One fundamental point is that all the subjects must take the test under standard environmental conditions. Psychological techniques are somewhat unique in this respect. A chemical reaction, for example, does not depend very much on ventilation, time of day, external noises, or nervousness of the elements involved. In a psychological testing situation if the testing room is sometimes noisy and sometimes quiet, this immediately introduces a variable. Such things as illumination, distracting noises, and general physical comfort, must be constant throughout the entire project. Although a person sometimes can rise to the occasion and overcome distractions, there is no guarantee that this will occur. It is especially important to watch for difficulties if the testing facilities are in the vicinity of an industrial plant. The writer once installed some testing facilities in an upstairs room which appeared well-lighted and comfortable, without taking the precaution of looking out the window. While the first group of subjects was going through, a freight train made up below the window.

---

[3] Paterson, D. G. and Tinker, M. A., "Time Limit *versus* Work Limit Methods," *American Journal of Psychology,* 1930, 42, 101–104.

Another general precaution deals with the attitude of the subject. The importance of rapport in individual tests has been noted (page 239). It may not be quite as essential in a group testing situation as with individuals, but nevertheless the subject's attitude should make him attempt to do his best, follow directions, and cooperate with the examiner. Some preliminary explanation of the purpose of the tests and the way they fit into the whole employment procedure will often help in this respect. In situations where the subjects may be somewhat excited over the prospect of being examined, it is customary to use a shock absorber. This is a brief test preceding the others which is not scored but serves to start the subject and get him over his initial excitement. Another helpful procedure is to give the subject some indication of how he is getting along. He often raises this question himself: "How am I doing?" Sometimes an encouraging but actually noncommittal answer to this type of question will increase motivation and promote a favorable attitude.

Test material. A number of problems arise in connection with the actual devising or selection of material used in psychological tests. An initial consideration is the actual difficulty of the items used. The items should not be made up and used at random; the difficulty of each item should be determined first. This is done by trying the items in a preliminary way on a small number of subjects individually and noting with a stop-watch the time required by each subject to answer each individual item. The average time required for an item is a rough indication of its difficulty. Once this item difficulty is ascertained, it is possible to put the test together in any desired fashion. There are two general types—termed speed tests and power tests. In the former the items are all of about equal difficulty, and it is simply a question of how rapidly a person can do them. A subject who does fifty items is about twice as effective as a subject who does twenty-five items in the same time. In the power test, on the other hand, the items increase in difficulty starting with comparatively easy ones and extending to the approximate limit for the subjects. The emphasis is not so much on how rapidly one works as on the level of difficulty one actually can attain. Although a power test usually has a time limit, it often develops that the subject would still make about the same score if double the time were permitted, because he reached his ceiling.

There is a misconception that speed tests are unfair. Subjects frequently remark that if they had had more time, they would have been able to finish the test. That is perfectly true, but it would also be true for their competitors. After all, the purpose of the speed test is to find out what a person can do when there *is* a premium on speed. As a matter of fact, a great many things in life are done against time. Actually the fairness of the test depends on whether it can be used to predict some correlated ability. If scores in a power test correlate more highly with efficiency in bookkeeping than do scores in a speed test, then the power test is fair for selecting bookkeepers. There are plenty of empirical indications that persons who do well in speed tests actually achieve more in other work.

In the alternative-answer type of test, there are several misleads, that is, answers which are incorrect and against which the subject must discriminate. The difficulty of these misleads should be considered. A mislead not only must mislead somebody but must be definitely incorrect. If the mislead is very equivocal, it is undesirable. The best procedure is to try out the test on a relatively small sample, and note what proportion of the subjects select each of the alternatives. If a mislead fools nobody or catches 30 per cent of the subjects, it is revised accordingly and tried with another sample. Misleads which catch 5 or 10 per cent of the subjects usually are regarded as satisfactory. Another variable to watch is the actual location of the correct alternative. It is an empirical fact that when people are simply guessing at the alternatives in a five-alternative test, they most frequently select No. 1 with No. 5 next in frequency followed by 3, 4, and 2. This indicates that the correct alternative should be in different positions in different items, in order to average out the space error.

In a test that comprises a number of different types of items, such as the typical intelligence test, the usual procedure is to group together the items of a given sort. For instance, the test begins with a page testing following directions, then one of simple arithmetic problems, then one of practical judgment, and so forth. It is possible to evaluate the different kinds of items separately, and determine the validity of these subtests. Sometimes, however, the items are scrambled, to form an *omnibus* test. This has two or three opposites, two or three analogies, a few arithmetic problems, then some information questions, then some more opposites, and so forth. If a time limit is used for the entire test, the subject has had an approximately equal chance at each kind of item. When the items are grouped in the usual fashion, a time limit for the entire test would not be so satisfactory but it would be better to have a separate time limit for each page or each group of items. The omnibus test is especially useful in situations where subjects are coming in at odd times to take a test with a work limit. The examiner gives the subject a blank, notes the time on it, and then enters the time when the blank is returned. The omnibus test may be arranged with the items all of equal difficulty, or with them increasing in difficulty.

When test materials are made up, it is well to devise considerably more items than are required for a single test. There is always the danger that a copy will get out and applicants have access to it before taking the test. Hence, it is desirable to have a similar test of comparable difficulty. If numerous items have been standardized so that the difficulty of each is known, it is possible to make up several forms of the test which will be interchangeable because each form has the same total difficulty. It is often desirable anyway to have several forms of the test in case it is desired to check one against the other. The time always comes when an examiner wishes he had another form of the test for some purpose.

A test should be constructed with a view to its sensitivity. This means that it will give a considerable range of test scores for the subjects in question. If the items are so easy that almost everyone finishes, it is impossible to differentiate between subjects. If the test is so difficult that nobody can do more than two items, the only possible scores are 0, 1, or 2, and this again does not afford much differentiation. In other words, the items should be selected so as to be differential with the group of persons to be tested. This will yield a wide distribution of performance in the test and will facilitate more detailed predictions of the criterion.

Test instructions are essentially a part of the test and are just as important as the material itself. The subjects should all attempt to do the same thing and therefore the instructions must be absolutely standard for everyone. If one examiner says, "Go as fast as you can," and another one says, "Make no mistakes," an entirely different performance and attitude on the part of the subjects results. Or again, if some subjects are told to complete every item before going on to the next, and other subjects are instructed to skip the difficult ones and go back to them later, some of the former subjects may spend practically the whole time working at a single difficult item, and the latter subjects make a much better over-all showing. Once the instructions have been formulated, it is absolutely essential that they be kept standard throughout the whole program. It would be just as serious to change the instructions as it would be to change the test material itself and then attempt to compare subjects who had been given the different materials.

Test instructions usually take the form of explanation, illustration, and practice. The introductory statement tells the subject what he is to do:

"pick out one of the four alternatives at the end of the line which is the opposite of the word given at the first of the line." Then an illustration is presented and the correct answer shown. After that, a few additional items, preferably easy ones, are provided on which the subject can practice. After he has done this, he should have a clear idea about what is expected of him in the test. It is important, too, that the instructions be clear from the standpoint of the particular subjects involved. This is largely a matter of vocabulary. If some subjects are told to "cross out every pair of adjacent numbers whose sum is ten," they would comprehend it, whereas other subjects might not know the meaning of the word "adjacent." It is well to try out the instructions on some people at the intellectual level where the test is to be used, and if any ambiguities are encountered, clarify them.

The mention of practice as a portion of the test instructions raises the further question as to the actual effect of practice on performance in a specific test. Various investigations have been made in which tests were repeated over a considerable period and early performance correlated with later. The results were none too encouraging in general, and, for many tests, the initial performance was not very predictive of later performance in that same test. However, the important consideration is the validity of the test for the particular stage of practice in which the sample is taken, and this same stage may be used always when testing applicants. Even so, tests vary considerably in the practice effect. There are indications that practice tends to increase the differences between the subjects with the more complex types of tests. Another situation sometimes arises which makes practice a serious consideration. If other employers in the vicinity happen to be using the same test, and it is susceptible to practice, an applicant may have had previous practice on that same test in another employment office. There are three general possibilities for controlling the practice variable. One is to pursue the test to the limit of practice before actually taking the record. It is simple enough experimentally to determine how many trials are necessary before the average subject reaches his maximum. This procedure is practically feasible only when the test has a rather brief practice effect. A second alternative is to neglect practice if the effect is not very great. This assumes essentially that if the subject did have more practice, it would not alter his results significantly. The third possibility is to select some arbitrary stage of practice for the actual test record, for example, give ten practice trials and then begin taking the real test. Whatever procedure is adopted, it should be kept constant throughout, and validity determined under those specific circumstances.

Another problem in test instructions is whether to have them printed or oral. When the test involves a printed blank, it is routine practice to have the instructions printed on the blank. This eliminates the personal equation of the examiner and any undue emphasis that he might give to certain words. There are occasions when it is desirable to have the instructions oral so that the subjects will not jump the gun. The instructions must be standard, and when the examiner gives them orally, he must use exactly the same words every time.

Incentive. It is important that subjects work with a maximum incentive when taking tests; otherwise incentive will introduce an additional variable. If one subject does his very best when taking a test, and another one does two thirds of his best, the two subjects cannot be compared. It would be impossible to have all the subjects exert two thirds of their maximum effort. The only way to keep incentive constant is to keep it at a maximum for everyone.

This maximum incentive is fairly well cared for in the employment office by the test situation itself. If a man is applying for a job and realizes that the test has something to do with his securing the job, naturally he will do his best. It is in the research situation where tests are being validated that control of incentives is more difficult. With higher-level subjects it may be feasible to explain the actual purpose of the research, and indicate that they are being used to set the standard. It is possible sometimes to appeal to their pride, suggesting that the test is being standardized on people who are already successful in their jobs. Occasionally, some little hint as to how they are getting along or about how far in the test people generally get, is helpful. This has to be done very judiciously, however. There is also a negative problem of avoiding discouragement in some cases. A test may be rather difficult for the particular subject, or he may not get as far as he thinks he should. If this situation is suspected, it may be well to point out that he may be qualified for some jobs which require different training and skill from those covered by this test, but that it will help in determining just what are the best jobs for him. Along this line is the embarrassing situation which sometimes arises when a top executive insists on taking some of the tests and does poorly. It is necessary to point out that the dexterity measured by the test is not required in his work but different tests would be needed to predict executive ability.

Scoring tests. Tests of the clinical type have the answers written down by the examiner while the examination is in progress. In most employment tests, however, the subject marks on a blank, and somebody subsequently goes over this and derives a test score. With the unequivocal types of test response any clerk, without psychological training, can score the test accurately. There are still, to be sure, some tests which have to be handled in a subjective fashion. In measuring handwriting the best that can be done is have certain specimens ranging from good to poor, which serve as a scale with which each specimen under examination must be compared by the scorer. However, in the great majority of tests the scoring is objective and unequivocal.

In any considerable testing project the ease of scoring is an important consideration because it contributes directly to cost reduction. Techniques for facilitating scoring were considered in Chapter 4 (page 72). They included the stencil showing the location of the correct answers, the pre-scored test blank, and the machine for electrical scoring.

It sometimes is necessary to evaluate speed *versus* accuracy in deriving the final score for a test. One subject may cover a lot of items but make many mistakes, whereas another does perfectly as far as he goes, but covers little ground. It is difficult to determine which one of them deserves the higher score for his performance. With some tests it is feasible to score according to speed alone, neglecting the mistakes. This is permissible usually only when the mistakes are comparatively few. Other tests may be scored according to accuracy alone when the subject is required to correct a mistake before he can continue. Some performance tests have this feature. For example, in a continuous-choice reaction test the subject presses a key for his answer. If he presses the incorrect key, the apparatus jams, and he has to find the correct key before the next stimulus is presented. Thus he can be scored on the amount done, with accuracy constant or perfect. The third and most common procedure is to weight speed and accuracy into a combined score by counting the number of items done correctly and then deducting so many points for each error. This can be done arbitrarily or scientifically. An instance of the former would be typewriting contests where five words per error is the standard penalty. Someone merely decided how serious a mistake should be considered. In some tests the weighting of errors is obvious from the theory of probability. A common instance is where there are only two choices on each item and the subject has an even chance of hitting the correct answer by accident even though he knows nothing about the items in the test. In this case it is customary to score the number right minus the number wrong, which gives a score of zero for a person who merely guessed at the answers (*cf.* page 130).

The best method for combining speed and accuracy is one which weights them both so that the combination will have the highest possible correlation with the criterion. It is possible to weight different tests in a battery according to their partial correlations with the criterion, that is, their unique predictive values. By the same token, the single test may be regarded as actually two tests, one of speed and one of accuracy, and the two may be weighted likewise. This necessitates correlating speed and accuracy separately with the criterion and with each other and applying certain formulae to be discussed presently. As a matter of fact, it is not necessary to go through the detailed procedure of partial correlation with a single test; a simpler formula covers this special case.[4]

Test reliability always should be determined. If the test is only a sample of behavior, it is possible that this sample is not sufficiently typical or reliable to be of value. Suppose a test comprises fifty items. If there had been 100,000 items, undoubtedly the test would come nearer to sampling the individual's actual capacity. The question, then, is how typical or reliable is the particular sample. An approximate answer to the question may be obtained by giving the test two or more times, and noting if it yields the same answers each time. For some tests the identical items can be repeated, and for others it is necessary to have a second form of the test of presumably equal difficulty. The notion of reliability may be clarified by an example in another field. Suppose that a steel tape is used to measure two objects, say a table and a desk, and they are 59 and 58 inches in length respectively. If the measurement is repeated, presumably the table will still be about an inch longer. If, however, a cloth tape is used, it might be stretched to different degrees so that now the desk appears longer than the table. In this case the tape could be termed unreliable. Similarly, if subjects taking a test are arranged in order of their proficiency and then are tested again, and the second time they score in exactly the same order, then the test is reliable like the steel tape. If, however, the order on the second administration is somewhat different, then the test is unreliable like the cloth tape. Hence, it is standard practice to check test reliability in this way by correlating one form with another. A further variation is to correlate one half of the single test with the other half, using the first half *versus* the last half, or preferably, because of possible practice effect, correlating the score for the even numbered items with that for the odd numbered items. A minor technical point arises in this last procedure: the reliability obtained is actually the reliability of a half-test. If the test comprises 100 items and scores for the first 50 are correlated with scores for the second 50, the result is the reliability of a fifty-item test. It is possible by a simple formula, however, to correct this coefficient and determine the reliability of the entire test, which is always larger than that for the half-test. It is always well to investigate tests from this standpoint before evaluating them further. There is no sense in starting out with a rubber yard stick. If a test is unreliable, some things that may be investigated with a view to increasing reliability are wider range in item difficulty, more objective scoring, greater homogeneity of the material, removal of ambiguities, and more uniform incentive.

---

[4] Thurstone, L. L., "A Scoring Method for Mental Tests," *Psychological Bulletin*, 1919, 16, 235–240.

Criteria

Need. Before using tests for employment purposes, it is necessary to determine their validity by correlating them with a criterion, that is, with some index of actual ability on the job. The whole program stands or falls with the criterion because the tests are selected, and modified, and weighted in order to get the highest possible correlation with the criterion. This point may be clarified by an actual incident. Ratings by a foreman constituted the criterion, and this particular man had a bias in favor of the older employees. What he actually turned in was a series of ratings which were based almost entirely on age. Thereupon, the research staff took this criterion at its face value and spent considerable time developing tests to correlate with it. When they had finished, they had a battery of tests which would make a fair prediction of an applicant's age.

A practical consideration is the desirability of insuring that the criterion will be available when it is needed. Sometimes a lot of tests are administered in the expectation that ratings by the supervisors will be forthcoming. Then one of the supervisors quits his job or dies before making the ratings. It is good practice to get the criterion in advance, thus insuring its availability. If a few subjects who have taken the tests disappear, it is not so serious, but if the criterion is missing, the project is a total loss. It is possible to validate the tests by giving them to applicants for employment but the criterion does not become available for weeks or months after they have learned the job, which delay usually is prohibitive.

Production figures. Production is, after all, the most obvious criterion. It is the thing which justifies the worker's presence in industry, and usually it is the thing which it is desired to predict. Many jobs lend themselves readily to a tabulation of production figures. Often these data are kept for purposes of making out the payroll—such things as the number of cases inspected, the number of pairs of shoes packed, the number of tires built, and sales records. Sometimes quality is considered too, for example, the amount of material passing inspection or the number of units which are discarded, or even scrappage. If such data are available, they constitute a straightforward criterion.

There are a number of things which must be watched, however, in connection with securing a production citerion. One of these is incentive. If workers vary in the extent to which they exert themselves on the job, it is difficult to derive an index of what the worker really can do. He may be in poor physical condition, or distracted by worries, or just lazy. Just as with tests, the most satisfactory production data are obtained when the workers are maximally motivated and are doing something approximating their best. If some of the workers do their best and some do three fourths of their best, they are not comparable, and using their records for a criterion would introduce errors. Production figures obtained for workers who are on piecework are generally better from this standpoint than the production records of day workers. There are various systems of payment, but the essential point in the present connection is that if the worker's pay depends partly upon how much he does, so that he has the possibility of earning more by greater effort, he is more apt to be well motivated, and his production results will come somewhere near indicating what he can do when he is attempting his best. Another thing to watch is the equivalence of the different units of production. If one person is building a six-inch tire and another a four-inch tire, it is unsatisfactory to compare them in terms of number of tires. It is probable that the time-study people have already equated the different sizes of tires so that equivalent units will be available.

Amount of experience on the job should be considered in connection with a production criterion. Ideally, the criterion should be based on workers who have arrived—have had enough experience to be at their ceiling of proficiency. If tests are validated on the basis of the proficiency of workers who have reached their maximum, then it is possible to examine applicants and predict what they will do when they reach their maximum.

Work samples occasionally are employed as a criterion instead of the day-to-day production. The term is practically self-explanatory. With calculating machine operators, for example, it was possible to set up some standard samples of typical kinds of computation and determine the time required to finish these samples. Typists may be given material of the sort that is used most frequently in their office. A standard flight embodying certain maneuvers was developed for validating tests for airplane pilots.

Before finally using production data as a criterion, it is desirable to determine the reliability. This problem is similar to that of test reliability just discussed. Production figures for one week or a longer period may be correlated with those for a second similar period. If those workers who show high production in one period do the same in the second and so on down the line, the criterion is reliable.

Judgment of supervisor. Another widely used type of criterion is the judgment of the workers' superiors. There are one or two people who are sufficiently familiar with almost any employee's work to pass judgment upon it. In some instances this is the only type of criterion data available. In evaluating executive proficiency, there are no actual units of production. Estimates by supervisors or foremen take various forms. A simple one involves ranking the workers in order from the best to the worst, calling them 1, 2, 3, and so on. Although this does have the advantage of simplicity, it is open to the objection which characterizes any ranking procedure, namely, it sometimes throws away interesting and significant data. Any statistical treatment of the ranks assumes that the difference between No. 1 and No. 2 is just the same as that between No. 2 and No. 3, whereas No. 1 might actually be way ahead of all the others, and 2, 3, and 4 are bunched closely together. This distinction would be lost in the ranking procedure.

It is better practice, if possible, to use some method which yields quantitative scores to reveal the true comparative values of the estimates. Some type of linear scale is quite satisfactory. If the rater checks some place along a line to indicate his judgment, this check mark can subsequently be converted into a score by measuring its distance from the end of the line. For example, a blank like the following may be employed:

Name	*Lowest Fifth*	*Next Lowest Fifth*	*Middle Fifth*	*Next Highest Fifth*	*Highest Fifth*
Adams Andrews Briggs					

The names of the workers appear at the left, and the foreman is instructed to check for each one in the appropriate column as to whether he is in the highest fifth of all the workers in that job or in the next highest fifth, and so forth. Moreover, the rater is encouraged to grade more finely by putting the check-mark to the right or left within a given column. Subsequently, the distance of a mark from the left edge of the left column is measured in millimeters or a similar convenient unit. This linear arrangement is preferable to one in which the rater simply assigns an arbitrary number, say, from 1 to 100, because persons have developed different notions as to the meaning of such numbers. One rater may hark back to school experiences where 50 was the passing grade, whereas another rater will recall 70 as passing, and these memories will becloud the estimates of the workers. Instead of labeling the blank in fifths, a few descriptive adjectives or phrases may be scattered along like the following:

Many errors	Careless	Good quality work	Almost perfect workmanship

Just as with production criteria, the reliability of the ratings should be determined. The foreman may go through the rating procedure on two different occasions, preferably with some lapse of time between, and his two sets of estimates can be correlated. If he rates certain individuals consistently high and others consistently low, then one can be more sanguine about using these data for a criterion, because of their high reliability. If two supervisors rate the same workers, it is advisable to correlate one set of ratings with the other.

Combining heterogeneous criteria. In many instances it is possible to secure both production data and estimates by supervisors. This is highly desirable and gives a double check on the worker's efficiency. But the question then arises how best to combine these data into a single index for each individual. The validation procedure to be described requires the correlation of a test score with a single index of proficiency on the job. One possibility is to rank the workers on the basis of production, rank them on the basis of the estimates, and then average the ranks for each individual. Although this procedure is simple, it is open to the objection that ranking often throws away valuable data. A widely used method which obviates this difficulty is to convert the figures into standard scores. Technically, a standard score is the deviation of a given measurement from the average of that series of measurements divided by the standard deviation of the series. The standard deviation has been discussed elsewhere and is illustrated in the Appendix. It is essentially a measure of the variability of the scores or items which are being averaged. It is useful in the present connection because of the relationship between the standard deviation (σ) and the normal frequency curve (Figure 1, page 34). If the equation of this curve is derived, σ appears in the equation, and it is possible, by means of calculus, to move along the base-line of the curve in units of σ, and note just what area of the curve is included between a perpendicular erected at this particular point and one erected at the midpoint of the curve. For instance, if one goes out from the average a distance equal to σ and erects a perpendicular there, between that perpendicular and the one erected at the average lies exactly 34 per cent of the area of the curve. If one goes out 2 σ, the perpendiculars include 48 per cent of the area, and similarly for any other multiple or fraction of σ. A foreman's estimates may be averaged and σ computed and then each individual estimate converted into terms of that σ. If a worker is one σ above the average, for example, it is known immediately that there are only 16 per cent better than he is, and the other 84 per cent are below him in the judgment of that foreman. If he is one σ above the average in production he has exactly the same standing in that respect—he is superior to 84 per cent of the workers in production. These standard scores, deviation divided by standard deviation (x/σ), then, mean the same thing, whether they are production figures or ratings or any other kind of data. A standard score of -1 means that only 16 per cent of the cases are below the individual in question, regardless of what is being measured. Thus, these standard scores are comparable and can be averaged. In this way ratings and production data can be combined although one may be in millimeters and the other in terms of cases of shoes. This is the most widely accepted method of combining heterogeneous criteria.

Job Analysis for Selection of Tests

It is advisable to make some preliminary analysis of the job with a view to selecting or developing the tests which are to be validated experimentally. It would be possible to try tests at random, but many such tests would obviously be inappropriate and it simplifies procedure to experiment with tests which look as though they might have some validity. One can secure some suggestions along these lines by observing the worker. A psychologist who has worked around a laboratory or clinic will be alert to slight bits of behavior which may be significant. He notes whether the work is done automatically or with apparent conscious effort, whether the worker has to attend to several things simultaneously or concentrates on one thing, to what extent he has to exercise judgment and make decisions, whether the time taken to make motions is critical, and what kinds of materials or items have to be remembered. If the worker is asked what he thinks about during the job, it may develop that certain aspects require a lot of attention or that a certain motion is especially difficult. Other information may be obtained by questioning supervisors. If the foreman is asked what he usually finds wrong with men who are unsuccessful in this job, he may volunteer that they are too slow or can't keep their mind on their work or give a hint which suggests something in the field of reaction time or attention. On occasion, the person doing the analysis tries the job himself. One of the first psychologists who developed tests for taxi drivers spent a few weeks driving a taxi himself.

Previous job analysis. It may be possible to utilize results of a more extensive job analysis which has been conducted previously. In the present connection it is a question of ascertaining enough about the job to make possible the selection of valid tests. The usual job analysis is made for a broader purpose, including such things as duties, responsibilities, working conditions, hazards, tools, lines of promotion, hours, wages, and qualifications. The section of the analysis covering this last point is the one which is of most interest in the present connection. Some job analysis procedures include, among other things, a list of "worker characteristics," and the analyst, on the basis of his interviews and observations, indicates which of these are involved in the job. The psychologist who is developing employment tests may find such previous analyses helpful, but, even so, he will want to go around and observe the job himself and talk to workers as a further check. He is then in a position to select or devise tests which are to be correlated with the criterion.

Single Tests Reproducing Whole Situations

Once the criterion for an adequate sample of workers is obtained and the tests are selected on the basis of analysis of the job, the next step is to administer the tests to the workers and correlate the test scores with the criterion. In some cases everything is staked on a single, complicated test which embodies the total psychomotor situation involved in the job. In other cases the various mental or motor components of the job are tested separately. This twofold approach may be illustrated in the case of tests for automobile operators. The total-situation approach involves an endless belt a foot wide, traveling toward the subject over rollers. Small trees and telephone poles, to scale, are mounted along the edges so that the subject gets the illusion of driving down a highway as he watches this belt coming toward him through a small dummy windshield. Smaller auxiliary belts on top of the main one carry small cars—again to scale—through a complicated gearing arrangement. The subject can steer by turning a wheel which moves his little windshield to the right or the left side of the belt, and he can accelerate with a foot pedal. The gearing is arranged so that it is possible to overtake and pass the miniature cars which continue at the same apparent rate. There are oncoming cars in the left lane which must be avoided. If the subject strikes a car, an electric contact is made which disconnects things momentarily so that no damage is done, but the error is recorded. The subject operates for about fifteen minutes and passes as many cars as possible without hitting any. This single test reproduces a good part of the psychological situation involved in driving. The subject has to judge speed and distances, his reaction time is involved, and there are emotional aspects, particularly if he gets into a difficult situation or has a wreck. With the components approach, on the other hand, the judgment of speed and distance is measured by a target which disappears behind a screen after the subject has seen it move for a standard distance. He is supposed to stop it (behind the screen) when it has reached a designated point. The reaction time aspect is measured in conventional fashion (page 194) or with a small traffic light as a stimulus and an accelerator and brake pedal. The yellow light is a warning, and when the light turns red, the subject moves his foot from the accelerator to the brake pedal as quickly as possible. The time required for this maneuver is measured by the chronoscope. The emotional aspect may be determined by procedures analogous to those used in crime detection, recording breathing, tremor, and other involuntary responses when the subject is startled.

Validity. It will be profitable to discuss first the case of the single test because the problem is simpler from the statistical standpoint. Once the test has been devised, the first major step is to give it to the workers and correlate the scores with the criterion. For rough evaluation a rank difference correlation coefficient is adequate, but for the more refined work, the products-moments formula is standard practice, as it takes account of the actual magnitude of the scores. The next consideration is whether the validity is high enough to warrant using the test in the employment program. It will be recalled that the best way to interpret correlation coefficients is in terms of the extent to which they will reduce the error of prediction over what it would have been if one simply guessed or (what amounts to the same thing) if the correlation had been zero. For example, if a test's validity is represented by a correlation of .50, the errors made in predicting the criterion will average 13 per cent less than the errors made if no test was available at all (*cf.* Table 1, page 44). In many projects of this sort, correlations between .50 and .60 are obtained. They seldom are much over .70. Obviously the employment psychologist is not performing miracles, but if he can reduce the error of prediction by even 13 per cent, it will be worth while. On the basis of such considerations, it is necessary to decide whether the validity is sufficient to warrant using the test or whether to scrap it and begin over again.

If the test is of the pencil and paper type with numerous items, it is possible to increase the test's validity by revising or even eliminating some of the items. This necessitates determining the validity of each item. One way to do this is to select subjects at both extremes of ability in the criterion—for example, the best 25 per cent of the workers and the worst 25 per cent. Then for a given item we note the per cent of good workers who answer it correctly and the per cent of the poor workers who answer it correctly. If the former per cent is significantly larger, this is a valid item and it is retained in the final test. Items with low validity are modified and tried again or dropped altogether. It is common practice to start out with many more items than will be needed and eliminate the deadwood with a view to getting the most valid items. This makes the scores in the entire test, as revised, more valid.

If it is decided that a test is sufficiently valid to be used for screening applicants, it becomes necessary to interpret the score made by each applicant. In general, if the test is valid and an applicant makes a good score in it, he should be hired because it is probable that he will do well on the job. Conversely, if he makes a poor showing on the test, the odds are against his being a successful worker even after adequate training. It is necessary, however, to be more specific than this, especially when the scores are not extreme. After all, what is desired is the probability of the applicant's achieving some designated level of proficiency in the job, just as an insurance actuary wants to determine the chances of a policyholder's living to a certain age.

Predictions of this sort are based on an equation called a regression equation, which expresses the criterion in terms of the test. The standard notation is as follows:

$$x = r \frac{\sigma_x}{\sigma_y} y$$

or:

$$X - M_x = r \frac{\sigma_x}{\sigma_y} (Y - M_y)$$

Where x represents the criterion score, y the test score, and r the correlation between the two. The means (M_x and M_y) of the criterion and test scores respectively and the corresponding standard deviations are involved too. The first formula is expressed in terms of small x's and y's which are deviations from the mean or average. In actual practice it is simpler to use the longer equation which is in terms of X and Y, the actual or raw scores, rather than the deviations. When the specific means and sigmas and the correlation coefficient are substituted in the equation, it simplifies to a form like:

$$X = 5Y + 8$$

When an applicant takes a test, his score is substituted for Y in the equation, and solving for X gives the best possible prediction that can be made as to what he will do on the job. X, of course, is in whatever terms were used in obtaining the criterion. If the criterion was in actual production units, the equation will predict production. If the criterion was in standard scores, the predictions are in those terms.

Prediction tables. In actual practice it would be cumbersome to do this computation in the case of every applicant and, furthermore, although the equation gives the most probable criterion, or best bet, there is still some error in that prediction which should be considered. This error is finite and may be determined by appropriate formulae. If, for example, the answer came out 80 production units per hour as the best bet, it is desirable to know the probability that production will fall between 75 and 85 or between 70 and 90 units. It might be nine chances out of ten in the former case, and 98 out of a 100 in the latter. At any rate, this is important because, after all, the employer should know just how big a chance he is taking. It is possible to work out these probabilities in the general case for a given validity coefficient and derive a table showing just how big a chance is being taken in hiring a person who falls at any particular level in the test. Two such arrays are shown in Table 24. The example is perhaps a bit oversimplified, and in practice it might be better to have ten rows and columns rather than five, but the general principle is the same. Suppose the scores of all the people upon whom the test is standardized are divided into five equal groups, indicated by the Roman numerals in the successive rows in the table. The columns indicate similarly the five quintiles of vocational ability (criterion), with *A* the highest fifth. The table may be read as follows: If the validity is .50, of a hundred workers with test scores in Class I, approximately 43 will be in Class *A* in the job, 25 in Class *B,* 17 in Class *C,* and so forth, with only

TABLE 24

Interpretation of Correlations

I, II, III, IV, V are successive quintiles of test scores; *A, B, C, D, E* are successive quintiles of ability on the job.

			$r = .50$		
	A	*B*	*C*	*D*	*E*
I	43	25	17	11	4
II	25	24	22	18	11
III	17	22	22	22	17
IV	11	18	22	24	25
V	4	11	17	25	43
			$r = .70$		
	A	*B*	*C*	*D*	*E*
I	56	26	13	5	0
II	26	31	24	14	5
III	13	24	26	24	13
IV	5	14	24	31	26
V	0	5	13	26	56

4 in Class *E,* that is, the lowest fifth in the job. Similar predictions can be made for the 100 workers in Class II. The same figures can be applied to a given individual rather than to a group of workers. If John Doe scores in Class I in the test, the probability is 43 out of a 100 that he will be in Class *A* in the job, 25 out of a 100 that he will be in Class *B,* and so forth. The other section of the table indicates that for a correlation of .70 if an applicant is in Class I, the probabilities of his being in Class *A* are somewhat higher than when the correlation is .50. This reflects the fact that a higher correlation makes possible a more accurate prediction. Tables of this sort can be worked out for any correlation coefficient.

Such tables make it possible to decide whether or not to take a chance on an applicant. If the validity is .70 and the test score is in Class I, the employer runs practically no chance at all of getting a worker in the lowest 20 per cent on the job. If Classes II and III are included, these chances are considerably greater. Management will have to decide just whether to take that chance or not. Sometimes much depends on the labor market. If the market is such that it is necessary to hire almost everyone who applies, the employer cannot be too choosey, and can reject only those with very low test scores where the probability is very strongly against their success. It is common practice to decide upon a particular test score below which it is not profitable to hire anyone because the chances are so strongly against his success. This deadline is termed a "critical score." If there is an adequate number of applicants from which to choose, the critical score can be set rather high so that the probability of securing successful workers is also high. As indicated elsewhere, this does not necessarily mean the rejection of the individual for any kind of employment, but simply with reference to the job for which the tests have been validated. If he is not accepted for a job in which the odds are very strongly against him, there is a greater probability of his getting into a job where he can be successful, either in the same plant or elsewhere. After all, it is an unkindness to a person to employ him for a position where it is clear that he is doomed to failure.

Other tables serving this same general purpose have been derived, some of them a little more general in scope.[5] One such set implements answers to questions of this sort: If it is proposed to hire the best 30 per cent of the applicants, and "satisfactory" is defined as the best 70 per cent of the present employees (the sample on whom the test was standardized), then what proportion of those who have been selected thus will be satisfactory in the above sense? With a validity of .60 for the test the answer is 92 per cent.

---

[5] Taylor, H. C. and Russell, J. T., "The Relationship of Validity Coefficients to the Practical Effectiveness of Tests in Selection," *Journal of Applied Psychology,* 1939, 23, 565–578.

Follow-up. If the above procedures are followed with a single test which reproduces the total psychomotor situation of the job, it is feasible to give the test routinely to applicants for that particular job and decide whether to hire them. The research aspect should not end at that point; it is desirable to follow up the results after a while and see if things came out according to expectation. Suppose the original critical score indicated that about 80 per cent of the applicants should be satisfactory. After a considerable number have been hired and have learned the job, it is well to check and see if about 80 per cent are satisfactory, that is, if the test is doing what it was supposed to do. The job itself may change from time to time, or the quality of the applicants may vary so that some revision of procedure may be necessary. Occasionally, in this way some dramatic results are secured which may be useful in further promotional work. For example, after some aptitude tests for motormen had been installed in Milwaukee, only about 0.6 per cent were discharged because of accidents, whereas in a similar period prior to the tests, 14 per cent had been discharged.

Battery of Tests

Instead of developing and validating a single complicated test, it is a more frequent practice to select several tests to measure the psychomotor components of the job and constitute a test battery. The tests are selected on the basis of job analysis as in the other case. Test scores are correlated with the criterion to determine which are the best tests. It generally works out that some of the tests have reasonably high validity and others very low. The latter are scrapped and further consideration is given to the limited number which have satisfactory validity.

Weighting the tests. An additional problem, which arises at this point, is how much weight to attach to each test. It would seem logical to give most weight to those with the highest validity but it is not as simple as this because the tests overlap. Suppose that in a battery there was one attention test and two memory tests, and that attention and memory were of about equal importance with reference to predicting ability on the job. If all three tests were weighted equally, the memory factor would be overweighted at the expense of the attention factor. Thus, other things being equal, tests which overlap should not count so heavily, whereas a more unique test would deserve more weight because it was contributing something not involved in the others. This overlapping of the tests can be determined directly by correlating the tests with each other and is routine procedure with a battery of tests.

The general principle is to give greater weight to a test which has a high correlation with the criterion and a low correlation with the other tests. Such a test is unique and is also valid. The actual weight is determined by the technique of partial correlation. This goes a step beyond the ordinary correlations discussed up to this point. It is possible to compute a coefficient which gives the correlation between the tests and the criterion which would be obtained if all the other tests were constant, that is, which shows the unique relationship of this test to the criterion. This unique relationship could be determined empirically if there were enough individuals in the sample. The procedure would be somewhat as follows. Suppose there were three tests and 10,000 subjects. Out of this 10,000 there might be perhaps 1,000 who scored equally in the first test. This limited thousand could be given the second test and perhaps 100 of them would have identical ability in this second test. With this selected 100 who had identical ability in both tests 1 and 2, it would be possible to compute the correlation between the criterion and Test 3. This would indicate the unique relationship of Test 3 to the criterion, independent of the contributions of those other tests to the criterion. Naturally, this empirical procedure cannot be followed except under very rare circumstances. However, the same results can be achieved analytically by a relatively simple computation. The computation involves working out formulae which are all similar to the following form:

$$\surd 1 - r_{13}^{2} \;\; \surd 1 - r_{23}^{2}$$

The notation r with the subscript 12·3 means the correlation between variables 1 and 2 with 3 constant. Usually 1 is taken as the criterion and the other numbers represent tests. Thus, the correlation between the criterion and Test 2 with 3 constant could be computed from this formula. It is to be noted that the terms in the formula are simply the correlation coefficients computed from the original data. In this case, there was only one thing constant, Test 3. More tests would necessitate correlation coefficients like $r_{12\cdot34}$, which would mean that Tests 3 and 4 were constant. Coefficients of this order with two things constant can be computed from certain coefficients of the first order—with one thing constant—by substituting them in formulae very similar to the above. By stepping up one stage at a time, it is possible to get coefficients between the criterion and one test with any number of other tests constant. This involves plenty of arithmetic, but there are short cuts.

Regression equation. A simple regression equation was described for expressing the criterion as a function of a single test. With more tests a more complicated regression equation expresses the criterion as a function of the sum of the tests appropriately weighted. The equation is of the general form:

$$X_1 - M_1 = r_{12\cdot34}\frac{\sigma_{1\cdot234}}{\sigma_{2\cdot134}}(X_2 - M_2) + r_{13\cdot24}\frac{\sigma_{1\cdot234}}{\sigma_{3\cdot124}}(X_3 - M_3)$$
$$+ r_{14\cdot23}\frac{\sigma_{1\cdot234}}{\sigma_{4\cdot123}}(X_4 - M_4)$$

Where X_1 is the criterion, X_2 is one test score, X_3 is another test, and so forth. The coefficients of these terms involve the partial correlations and the standard deviations. These latter actually are computed from certain of the partial coefficients and give the standard deviation of a variable, supposing the other variables were constant. The formula is somewhat similar to the equation obtained for a single test, except that it has partial correlations instead of the ordinary correlations. When actual values for r, σ, and M are substituted the equation simplifies to a form like:

$$X_1 = 13X_2 + 7X_3 + 16X_4 + 29$$

It will be noted that each test is weighted somewhat according to its partial correlation with the criterion. If we examine further the formula for $r_{12\cdot3}$ given above, we find it will be larger if Test 2 itself has a high initial correlation with the criterion (r_{12}), and if the test has a low correlation with the other test (r_{23}). In other words, this partial correlation takes account of the two stipulations mentioned above that the greatest weight accrues to the test which has the highest validity and which is most unique or has the lowest correlations with the other tests. It can be shown mathematically that if the tests are weighted according to this regression equation, the multiple correlation between the weighted sum of the tests and the criterion will be higher than if they were weighted in any other fashion. Frequently the tests appropriately weighted have a validity at least ten points higher than the best test in the group taken alone. This improvement in validity will be greater if the tests are relatively independent of each other. For example, if two tests have validities of .60 and .50, and the correlation between the two tests is 0, then the multiple correlation, that is, the correlation of the battery with the criterion, is .76. If, however, the same two tests with validities of .60 and .50 intercorrelate to the extent of .80, then the multiple correlation, or their weighted sum, is only .60, which is no improvement whatever over the better single test. When they overlap to this extent, the addition of the second test is worthless.

Short-cut methods. There are various statistical devices for shortening this computation. One widely used technique called the Wherry-Doolittle Method[6] selects at the outset what appears to be the best test, then determines the next best one and combines it with the first to determine what the multiple correlation would be with only those two. Then, a third test is added and the multiple correlation for the three tests computed and so on. This procedure is continued until it reaches the point where the addition of further tests does not increase the multiple correlation appreciably. With the ordinary procedures described earlier it is necessary to make a decision in advance as to how many tests to use in the equation, and perhaps a smaller number would have been just as satisfactory. This Wherry-Doolittle method determines just how far it is profitable to go. To cite an example, ten tests were being evaluated with reference to potentiality for machine calculator operating. The correlations and intercorrelations were computed, and then the above method applied. The results are summarized in Table 25. The first test, called Number-Dot-Location involved circling certain dots in a complicated array according to numbers assigned to the different locations. This test had a validity of .49. When the results of a standard arithmetic test were included, the validity of the two together, properly weighted, was .55. A tapping test which involved putting dots in circles on a blank was then included, but its addition increased the validity only two points up to .57. The next test was one which involved putting dots in certain circles in a cluster, according to a plan which depended upon a key letter appearing between the circles and also upon the letter in the previous cluster. The addition of this test to the others increased the validity only one point, and the addition of still another test of substituting digits for letters raised it one point more. Thus it seemed reasonably adequate to stop with the first three tests and the validity of .57.[7] A procedure

TABLE 25

Multiple Correlations when Adding One Test at a Time

Number-Dot Test	.49
Arithmetic	.55
Tapping	.57
Choice Dotting	.58
Digit-Letter	.59

---

[6] See Stead, W. H. and Shartle, C. L., *Occupational Counseling Techniques*, Appendix V. New York: American Book Co., 1940.

[7] Gottsdanker, R. M., "Measures of Potentiality for Machine Calculation," *Journal of Applied Psychology*, 1943, 27, 233–248.

like this makes it possible to derive about the best possible battery of tests and to economize time of applicants and examiners in subsequent operation by not including any more tests than necessary to get the maximum possible validity.

Miscellaneous Examples

There are numerous reports in scientific journals describing aptitude tests of either total-situation or components type as used in particular vocational situations. It will be feasible at this point to cite only a few examples. Many test projects deal with industrial work of various sorts. For instance, a test for prospective lathe operators involved two large screws feeding at right angles and controlling a pencil. The subject traced a pattern with the pencil by manipulating the screws. A series of tests for electrical substation operators included puzzle boxes, following directions in switching operations, a learning test which was a sort of choice reaction, and a test of persistence. The criterion consisted of supervisors' ratings and a record of operating errors. It was possible to set a critical score in a battery of these tests so that it would admit only 8 per cent of the poorest workers but 71 per cent of the best operators.[8]

Many of the tests developed for office workers are similar to the usual intelligence test. A widely used test includes pairs of numbers, each comprising ten or a dozen digits, and the pairs are either identical or have a minor difference. The subject indicates quickly whether the numbers in each pair are the same or different. Satisfactory validities have been found for these and other tests of clerical aptitude.[9]

Many tests have been devised for automobile operators, and other tests have been developed for public service employees such as firemen, policemen, and telephone operators.

Selection of salesmen is one of the more difficult problems encountered by the employment psychologist. This is partly caused by the fact that this work puts a heavy premium upon personality factors, and tests for measuring these characteristics are none too satisfactory. The subject is called upon to evaluate himself and may not do so truthfully. The ultimate answer to this problem will doubtless be the one suggested earlier of devising objective personality tests which are scored indirectly and which are arranged so that the subject cannot tell what really is a good answer. It is somewhat the same story with tests for executive ability because here, again, successful performance depends upon personality characteristics. In this field, also, it is difficult to secure an adequate criterion because of the complex nature of executive work and its lack of any specific units of production.

---

[8] Viteles, M. S., "The Human Factor in Sub-Station Operation," *Personnel Journal*, 1929, 8, 81–113. For a general review of tests involving apparatus in industries see Zerga, J. E., "The Development and Use of Apparatus Tests in Industry," *Journal of Applied Psychology*, 1944, 28, 199–201.

[9] For a general review see Anderson, R. N., "Review of Clerical Tests. 1929–1942," *Occupations*, 1943, 21, 654–660.

Numerous tests along the above lines were developed during the war. The Air Forces had tests to discriminate pilots, bombardiers, and navigators. Many of these involved various types of visual-motor coordination.[10] The Army had the general classification test and numerous specialized tests, including one for radio aptitude. The Navy developed extensive series of tests for a wide range of assignments.

The question sometimes arises whether to employ a test for the total psychomotor situation or to use the components approach. The former has the disadvantage that it puts all the eggs in one basket; if low validity results, the efforts have been wasted, and it is necessary to start over again. However, the total-situation test often looks more like the real thing so that it is better for promotional purposes and may even secure better rapport. The components approach, on the other hand, will salvage some tests even though many prove worthless. It has the additional advantage that by weighting the tests appropriately it is possible to increase the total validity appreciably above that of any single test in the battery.

Intelligence Tests

General hierarchy. Tests of intelligence or general aptitude do not play as large a role in industry as do special aptitude tests. However, they are sometimes helpful in placing the individual roughly at his appropriate industrial level. This intelligence hierarchy was discussed in connection with vocational guidance (page 196) where considerable use is made of the fact that professional people average highest in intelligence, business and clerical workers come next, then the skilled workers, and finally, the unskilled. Occasionally, an employment department finds the hierarchy useful, especially when special aptitude tests are not available, in forestalling serious misplacement. A person with good intelligence should not be placed in routine, unskilled jobs, but should be groomed for something higher. A similar hierarchy was found in connection with sales persons. Those who sold a technical product in the electrical industry rated highest, insurance salesmen came next, then salesmen working for wholesale organizations, and finally, counter sales people. The intelligence requirements of these different types of work were somewhat different, quite apart from any other characteristics necessary in selling.[11]

---

[10] Miles, W. R., "Psychological Aspects of Military Aviation," *American Scientist,* 1945, 33, 147–158; also Flanagan, J. C., "Personnel Research in the Army Air Forces," *Public Personnel Review,* 1945, 6, 3–39.

Correlation with criterion. It is possible to give an intelligence test to employees and correlate their scores with the criterion just as with any other aptitude test. This has been done more frequently in the clerical field, and some adequate validities have been found. In one instance the validity was .76[12] with women office workers. The interpretation of an intelligence test score under these circumstances is exactly like that discussed in connection with the single test for the total situation involved in the job, with one exception. It is possible to have too much intelligence for a job—not from the standpoint of being *able* to do the job, but from the standpoint of being *willing* to do it. Table 8 (page 199) showed that workers with high intelligence had considerable turnover in low-grade routine clerical jobs, whereas those with low intelligence were more stable in those jobs. Thus, in connection with intelligence tests in industry it is the optimum rather than the maximum intelligence that is desired. In addition to the usual lower critical score, it is necessary to set an upper critical score and hire people only between those two terminal points.

Interest Tests

There are occasions when the employment psychologist is concerned with the applicant's interests but the problem is not as central as it is in the case of vocational guidance. In the employment office the applicant presumably has some interest in the type of work which he is seeking. However, there are times when the employment man suspects that the interest expressed is not genuine and may want to check up on it with a view to long-time adjustment. Again, the employment interview sometimes takes a turn in the direction of vocational guidance (*cf.* page 206). In such cases the inventory type of interest measurement is available. The subject checks numerous items according to whether he likes or dislikes them, and the blank is scored to reveal patterns of interest in different occupations. As a matter of fact, the development of interest inventories stems from the needs of an industrial employer who approached the psychologists at Carnegie Tech in 1919.

---

[11] Miner, J. B., "Standardizing Tests for Vocational Guidance," *School and Society,* 1921, 13, 629–633.

[12] Kornhauser, A. W., "Some Business Applications of a Mental Alertness Test," *Journal of Personnel Research,* 1922, 1, 103–121.

Trade Tests

Nature. The discussion of employment procedures thus far has dealt with aptitude or capacity tests rather than proficiency or achievement tests. The latter appear in industry as trade tests. They are not nearly so widely used as aptitude tests but they have their place, for there are times when it is necessary to hire persons skilled in a trade at the time of hiring. Experience indicates that it is not always feasible to take the man's own word regarding his proficiency, or even take the journeyman's card, which he carries, at face value. The card may indicate simply that he worked as an apprentice for a specified number of years. This difficulty was brought out forcibly in the first war when the authorities were attempting to place soldiers in assignments that utilized skills they were supposed to have acquired in some trade. The result was an extensive development of trade tests. Although a supervisor who is skilled in the trade himself can find out by talking to an applicant whether he knows his way around in a trade, it is advisable to have a procedure such that a person without trade knowledge can administer tests to yield the same answer for routine employment work.

Basic principles. The development of trade tests rests on two fundamental principles. The first is that a tradesman will have considerable information about the details of a trade. A person who does not know the angle of lathe centers or who does not know the purpose of a dog on the lathe certainly has not been around a machine shop. The second principle is that the tradesman should be able to demonstrate certain skills which he has presumably acquired in the trade. Thus, trade tests are built around these two aspects—information and performance. The latter is more crucial with reference to determining the actual degree of skill, but the former is especially valuable in a negative way to rule out quickly the person who has had little trade experience and is bluffing. If, however, an applicant passes the information test, there still may be some doubt regarding his actual skill. He might have been around the place a long while and picked up the terminology, but still be clumsy. Thus, the information test is especially useful in screening out the undesirables, and the performance test in determining the actual degree of proficiency.

Kinds of trade tests. Trade tests may be differentiated further with reference to the method of administration. Often the test is given orally. The items are developed in such a way that the answers are unambiguous, and the possible correct responses are provided in the examiner's key.

Two or three items from a few oral trade tests follow, simply to show the type of question. In each instance, the answer is also given.

Painter

1. What do you do to knots and sappy places before painting? *Answer:* Shellac
2. When is puttying done on new woodwork? *Answer:* After priming (first coat)
3. What is the brightest yellow used? *Answer:* Chrome

Bricklayer

1. Where do you use radial or round-face brick? *Answer:* In arches
2. What is used in the middle of a long wall to keep the line level? *Answer:* Twigs
3. What is a brick called when set on end? *Answer:* Soldier

Sometimes the trade test is implemented with pictures. For a carpenter there is a series of pictures of tools and questions dealing largely with naming the tools. For a storage battery electrician there is a diagram showing batteries connected in different ways, and the subject is required to state the voltage involved in the different connections.

Written tests may be used, generally in the alternative answer form, for example:

1. Half a brick is called: chunk; block; heel; bat.
2. Fire bricks are laid in: concrete; cement; fireplace; mortar.

Performance tests involve some standard task which is actually a sample of the type of thing done in the job, often on a small scale. It may be feasible to score the person according to the process he follows in carrying out the directions, or to score him on the finished product, or on the time involved. For an interior wireman the test provides two joists and cross-pieces fastened together to resemble a portion of a ceiling. The subject is given insulating tubes, knobs, wire, tape, and some tools. He is then instructed to run two feed wires across and through both joists, using the holes already drilled, and from these main lines tap off leads in parallel and drop a lamp cord from the support. This task is the duplicate of a certain portion of an electrician's job and various items can be scored—whether he gets the wires through the right holes, how he tapes the joints, whether he solders the necessary places. A test for truck drivers involves driving through a course marked off with stakes driven loosely into the ground, and every stake knocked down detracts from the score. The subject drives through a curved pathway, backs through another curve, backs up to a dummy loading platform and is graded as to whether he comes up squarely or at an angle, turns around on a side hill, and goes through other maneuvers. The examiner rides with him and scores him en route according to a standard pattern.

Criterion. In developing trade tests a less rigorous criterion is employed than with the aptitude tests. The average trade does not involve units of production but rather a wide variety of operations. Frequently there are only a few people in a given trade at the same place, so that ratings of an adequate sample by the same supervisors are not available. Therefore, it has been common practice to use as a criterion the ordinary trade classifications of expert, journeyman, apprentice, and novice. Although mistakes are undoubtedly made in issuing cards to people for these different classes, it is about the best that can be done. In some of the research done by the United States Employment Service a slightly different criterion was employed—experts for the top class, apprentices and helpers for the next, and, for the third, workers in related occupations. The inclusion of this last group was an effort to differentiate people who really worked at the trade from those who had been around these trades although they did not work at them. In developing tests for house painters, for example, the effort was to select items in such a way as to detect a paper hanger who was misrepresenting himself as a painter.

Item analysis. Validation of trade tests usually is done item by item. For instance, in developing a test for machinists a question about the dog on the lathe was answered correctly by 98 per cent of the experts, 83 per cent of the journeymen, 40 per cent of the apprentices, and 5 per cent of the novices. Thus, it is a valid item. If, on the other hand, about as many novices as journeymen answer a question correctly, it is not valid and is discarded. The test is analyzed item by item to determine the validity of each in this rough manner, and then those items which are most differential constitute the final test. There is still the question of setting a critical score in the final test. This can be done graphically as is shown in Figure 12. The four horizontal blocks of the diagram indicate the four trade classes of expert, journeyman, apprentice, and novice, and the abscissa indicates the number of questions answered correctly. Each square represents an individual. The novices score from 3 up to 11, and the apprentices have higher scores. The problem is to erect perpendiculars which will make the best possible separation between these trade classes. These are indicated by the vertical dash lines. If a critical score is set at 10, there is one novice above it and two apprentices below, but that is about as good a differentiation as can be made. The line differentiating between journeyman and expert misplaces only one person. A similar procedure can be followed without a diagram by

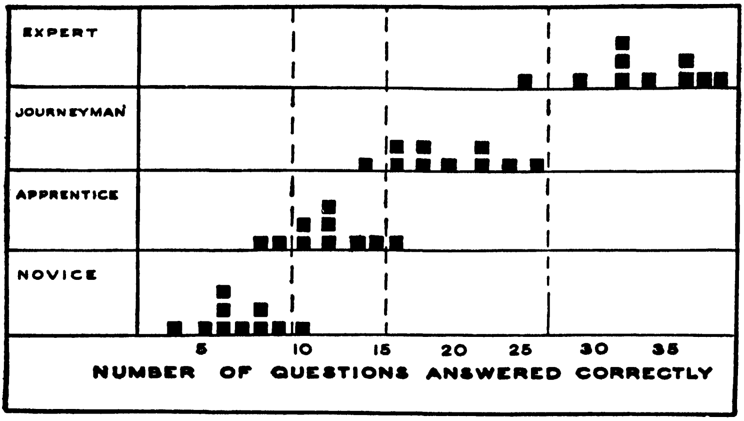


Figure 12. Setting Critical Score in Trade Test Items.

noting the per cent of people in each class making each score and cumulating these per cents and then noting certain differences between cumulative per cents.[13] With the trade test as thus developed it is possible to differentiate between different applicants who claim a certain trade status and to check on them objectively.

Summary

A basic consideration in vocational adjustment is the relation between the aptitudes of the individual applicant and the requirements of the job. The former can be evaluated frequently by psychological tests but it is necessary to determine whether the tests have adequate validity. Empirical validity based upon actual statistical evaluation is much superior to *a priori,* or face, validity. A psychological test may be considered as a sample of behavior. Some tests measure general aptitude or intelligence and others deal with special aptitudes. Personality tests are badly needed but in the industrial field the usual type, which requires the subject to evaluate himself, are of dubious value because of uncertainty that the applicant really tells the truth.

Various technical problems arise in connection with test administration. The individual test makes possible clinical observation of the subjects during the test, whereas the group test economizes on time and cost. The type of response most frequently involved is the multiple-choice variety. Tests are given with a time limit or a work limit, but the former is preferable in a group test. Various precautions must be taken in test administration—maintaining standard conditions and controlling the attitude of the subject through appropriate rapport. When test material is devised, it is advisable to determine the difficulty of each individual item. Then it is possible to build a speed test or a power test as desired. It is well to study the difficulty of the misleads in an alternative-answer type of test and also the location of the correct alternatives. Usually the items of a given type are grouped together, but occasionally an omnibus test is used in which the different types rotate. A test should be sensitive so as to give a wide range of test scores for the subjects under consideration.

---

[13] Stead and Shartle, *Occupational Counseling Techniques,* page 215. New York: American Book Co., 1940.

Test instructions are essentially a part of the test itself and must be kept standard. They usually take the form of explanation, illustration, and practice. It is well to ascertain further to what extent scores on the test will be influenced by practice. It may be feasible to pursue the test to the limit of practice before actually taking the crucial record, or to neglect practice if the effect is slight, or to select some arbitrary stage of practice at which the record is to be taken. Incentive must be controlled or it will introduce an additional variable. The best way to control it is to keep it at a maximum throughout.

Scoring of tests should be objective and unequivocal. This is feasible with the multiple-choice form, which also facilitates ease of the scoring because the correct answers have a specific location. They can be scored with a stencil or even by electrical devices. Sometimes it is necessary to evaluate speed and accuracy. If very few mistakes are made, they may be neglected. With some tests it can be arranged so that all errors must be corrected before going on, so that the accuracy is essentially constant. More frequently it is a matter of weighting speed and accuracy into a combined score. This may be done arbitrarily, but the best method is to weight them so as to get the highest possible correlation of the combined score with the criterion of ability which it is desired to predict. This weighting can be done by partial correlation techniques. The reliability of tests should always be determined. This can be computed by giving the test twice and correlating one administration with the other, or the test may be given in two forms which are correlated similarly, or one half of the test may be correlated with the other.

The validation of tests involves correlating them with a criterion. The whole program stands or falls with this criterion, because tests are selected and weighted so as to predict it. Production figures constitute the most obvious criterion and are more satisfactory for pieceworkers than for day workers, because incentive is better controlled. Previous experience should be relatively constant, or, at least, the worker should be at his maximum proficiency. Reliability of production figures may be determined by correlating those for one period with those for another. The judgment of supervisors is another type of criterion. This may involve ranking the workers in order of merit, but it is better to use a linear scale where the rater can grade more finely. Here again, reliability should be checked by having the supervisor do his ratings on two occasions or by correlating the ratings of one supervisor with those of another. If different types of criterion data are obtained, they must be combined into a single index for each worker to facilitate the subsequent validation of tests. The accepted procedure is to convert the ratings into standard scores, that is, deviation from the average of that particular group of scores divided by the standard deviation. This essentially locates each rating on a normal frequency distribution curve for that series of ratings or production figures. Standard scores of this type can be averaged together even though they represent heterogeneous data.

Some type of job analysis must be conducted with a view to selecting the tests which are to be validated for a given job. This may involve observing the workers, talking to them, interviewing foremen, trying the job oneself, or referring to a previous job analysis which has been made on a more extensive scale for other purposes.

In selecting tests it is possible on the one hand to devise a single complicated test which reproduces the entire psychomotor situation of the job or to analyze that situation into its psychomotor components and measure them separately. This distinction was illustrated in the case of tests for automobile operators. Considering for a moment the treatment of data for a single test the first consideration, of course, is its validity. This is obtained by correlating the test score with the criterion. If the validity is adequate, the next consideration is how to interpret the test score with reference to hiring or not hiring the applicant. An equation can be derived that expresses the criterion as a mathematical function of the test, and applicant's score is substituted in this equation, and the solution indicates the most probable criterion value for that individual. It is preferable, however, to deal with the general case so that for a given validity it will be possible, knowing the general level of performance of any individual in the test, to determine from a table the probability of his achieving a particular level of proficiency in the job. Then it is feasible to decide whether or not to hire him on the basis of the chance that it is necessary to take. It is common practice to set a critical score in the test and to hire no one who falls below this score. The procedure should not stop here, however, but should follow up the results later on and see if applicants hired on the basis of the test actually do come up to expectations.

With a group of tests for the components of the job an additional consideration enters—weighting the tests. This is done by partial correlation, and each test receives a weight roughly proportional to its partial or unique correlation with the criterion, that is, the correlation that would be obtained if the subjects all had constant ability in the other tests. A test gets a large weight in this equation if it has a high correlation with the criterion and low correlations with the other tests. An equation can be worked out embodying these weights, the test scores can be substituted in it, and the equation solved for the most probable value of the criterion. Short cuts in this procedure are feasible. It is possible, further, to add the tests one at a time and determine their combined validity as each test is added. It can be shown, moreover, that tests weighted in this fashion will have a higher total validity for the entire battery than if they are weighted in any other fashion. Tests of special aptitudes have been developed for general factory workers, clerical workers, drivers of various vehicles, salesmen, and for numerous military uses.

Intelligence tests are used less extensively in industry, but the occupational hierarchy mentioned earlier is of some use in locating an individual at approximately his appropriate level—professional, clerical, skilled labor, or unskilled labor. It is also possible to correlate intelligence tests with the criterion just as in the case of the specialized tests. An additional consideration here, however, is that it may not always be desirable, even though the intelligence test is valid, to hire people with the maximum intelligence because they may be dissatisfied with the job and find it insufficiently stimulating. Sometimes an upper as well as a lower critical score is necessary.

Interest tests play a much smaller role in vocational selection than in vocational guidance. However, if an employment man is concerned with checking upon the expressed interests of an applicant, the interest inventories described earlier are useful.

Trade tests are concerned with the worker's proficiency in a given line at the present moment rather than with his potentiality. They are based on one of two approaches—information about the trade or actual performance in certain operations. The information test is especially useful negatively in locating people who have not had experience with the trade and have not picked up the information. Actual degree of skill can be determined more accurately by the performance type of trade test where the individual goes through a small sample of the work itself. The test may be given orally, by means of pictures, in alternative-answer form, or with objective performance. The criterion used in validating trade tests is usually much coarser, involving just the conventional trade classifications. Items or questions that show appropriate differences in the proportion of the criterion groups answering them successfully are selected. Then a critical score is set, usually graphically, on the basis of the total score made on the selected group of items.

17

OTHER CONTRIBUTIONS OF PSYCHOLOGY TO EMPLOYMENT METHODS

Rating Scales

Purpose. Although the psychological test is the instrument most widely used by the employment psychologist and the one which he prefers if it is feasible, there nevertheless are situations in which other predictors must be employed. Most of them are less objective than the tests and they seldom have as high validity. The rating scale is one such predictor. It may be used to evaluate characteristics of the applicant for which adequate tests are not available. This is especially true in the field of personality where existing tests put a premium on the subject's own evaluation of himself and are unsatisfactory for that reason, at least in the employment office. When we want the judgment of persons who know an individual on his traits, the rating scale technique gets these judgments in a more systematic form. The technique is useful in supplementing the employment interview with the judgment of former employers and in rating present employees with reference to promotion or transfer. This latter rating is often done in the form of merit rating. The rating scale is essentially a more standardized or uniform method of expressing opinion.

Selection of traits. If a rating scale is to be used in connection with the selection of employees for any particular job, a first consideration is what traits or characteristics to include in the scale. The procedure is analogous to the job analysis, which is made when determining what tests to use, and it involves conferring with persons familiar with the work. The usual practice is to get the consensus of some experts on what traits they think important for the particular job. The most frequently mentioned traits constitute a list which is resubmitted to the experts or given to another, similar group with the request that they rank the traits in order of importance for the job in question. The average ranking for these traits gives a rough notion of their comparative importance. In some cases it works well to give the experts, at the outset, a suggested list of traits from which to select and to which they may add, instead of starting them cold. Such a list might involve general intellectual characteristics, proficiency in performance, accuracy and speed, various aspects of attitudes—ambition, diligence, and energy—and social characteristics such as leadership. The result of these procedures is a final series of traits which are to be included in the rating scale.

Weighting the traits. Inasmuch as the traits are not of equal importance, the problem of weighting them must be considered. It is not feasible to weight them according to their empirical validities, and the usual practice is to go back to the experts again for the weighting. If ten specific traits have been selected, each expert can be asked to spend 100 points on those traits, assigning to each a number indicating its comparative significance, but making his numbers total 100. The average weight attached to each trait by the group can be adjusted to a round number and minor adjustments made so that the weighting finally adopted will add up to some convenient total. An example appears in Table 26. It gives the final weights selected for a series of traits used in rating clerical workers. One set of weights dealt with duties involving only individual work, and the other with clerical duties where some supervisory responsibility was included.

TABLE 26

Typical Weights for Traits in a Rating Scale

	Individual	*Supervisory*
Appearance	10	10
Ability to Learn	20	20
Accuracy	25	10
Dependability	10	10
Speed	20	5
Cooperation	8	10
Constructive Thinking	7	10
Ability to Direct Work of Others	0	25

Defining the traits. The next step is to state what is meant by each trait in the form of a definition. Otherwise, each rater may put his own interpretation upon the trait. Leadership, for example, might suggest to one person constructive planning, to another, inducing a mob to do something, and to still another, marching at the head of a procession in the same direction the procession was going anyway. It might be desirable to say, "Leadership—ability to elicit the cooperation of his colleagues and subordinates, to promote morale, and to develop a loyal and efficient organization." An objective context for the statement is preferable. It is better, for example, to ask if a sales person "adapts her selling behavior to the particular type of customer," rather than merely use the word, "Adaptability." Moreover, it is well to express the definition with reference to the situation in which the trait is to manifest itself, for example, leadership in an industrial supervisory situation rather than leadership in group thinking.

Man-to-man rating scale. Having selected, weighted, and defined the traits, the next problem is to incorporate them in the actual mechanics of rating. The man-to-man rating scale is one of the earlier types which is not so widely used at present, but still has some good features possessed by no other scale. As the name implies, it involves comparing one man with another, and the comparison is implemented by what is termed a master scale. This consists, for each trait, of the names of a few persons well known to the rater who exhibit that particular trait in varying degrees. The procedure is illustrated in the following excerpts from a rating scale for minor executives. The example gives the scale after the rater has completed it. When he first receives the blank, no names of individuals are included. Only two traits are involved in the example, leadership and initiative. Earlier analysis assigned them maximum weights of 20 and of 15 respectively.

Leadership: Ability to elicit cooperation of colleagues and subordinates.

Highest	Daniels	20
High	Callahan	16
Middle	Haskell	12
Low	Ordway	8
Lowest	Clark	4

Initiative: Ability to get things done.

Highest	Pritchard	15
High	Titcomb	12
Middle	Goodwin	9
Low	Campbell	6
Lowest	Safford	3

The rater directs his attention first to leadership, thinks of all the minor executives of his acquaintance, and selects the one with the highest degree of leadership as defined in the scale. He feels that Daniels is such a person, therefore, he enters Daniels on the first line, which has a weighting of 20. Then from these same executives he selects the one who is absolutely the lowest in leadership, Clark, and puts his name on the bottom line with a weight of 4. Then he finds one who is about in the middle, and two others who are intermediate. This constitutes his master scale for leadership. He makes up another master scale for initiative in exactly the same fashion. The same individual may appear on more than one master scale, but in that case the rater must be careful when using a given master scale to think of the men on the scale only with reference to the trait covered by that scale. Once this master scale is made out for each trait, it is a permanent standard which the rater can use, but it is his own subjective standard. Nobody else can use his master scale. When he comes to the process of rating some one of his present executives, let us say Briggs, he thinks of Briggs' leadership in comparison with the five persons on the master scale. Briggs is not as good a leader as Daniels, nor anything like as poor as Clark. He seems perhaps just a little better than Haskell, but not as good as Callahan, so he is given a rating of 13 or 14. The next person to be rated is Loomis, and his leadership is almost exactly like that of Ordway so he gets a rating of 8. Then the rater considers initiative and does the same thing there, for Briggs and Loomis. The procedure is straightforward and simply involves these man-to-man comparisons.

The procedure requires some care and effort in making out the master scale. If the rater cannot be counted upon to devote the necessary effort, it is better to adopt some other procedure. This type of scale has one distinct advantage over other types, in that the ratings are not influenced seriously by such things as the mood of the rater. With other procedures, if one is rating Briggs' and Loomis' leadership on a particularly blue Monday, he may not consider either of them much of a leader, and in fact, all his ratings will be biased toward the lower end. If, however, he is using a master scale, and he does not think much of Briggs' leadership because of his present mood, neither does he think so much of Haskell or Callahan at that time, and after all, Briggs is intermediate between Haskell and Callahan, even though they are all pretty poor. The net result is that Briggs still gets a rating of 13 or 14, regardless of the mood of the rater.

Graphic rating scale. A widely used form of rating scale is the graphic type. This was mentioned briefly in Chapter 8 (page 202). It consists essentially of a line following the name of the trait or the description of it, and the subject checks somewhere along this line to indicate his rating. He is guided by adjectives or phrases distributed along this line. In the illustrative items given below, the rater in evaluating salesmen decides whether the man waits to be directed or discovers some leads. If the former seems to be the case, he checks approximately above that phrase on the line. However, he can check anywhere between the phrases.

Items for Salesmen

Does he strike out for himself in locating prospects?	Waits to be directed	Discovers some leads		Exceptional "nose" for prospects
Does he impress people as being sincere?	All he says taken at face value	Usually inspires confidence	Gives impression of bull-dozing	Arouses suspicion

Items for Teachers

Alertness	Always wide-awake and alive to present situation	Usually has wits about him	Fairly alert	Frequently becomes abstracted	Head in the clouds; preoccupied
Sense of Humor	Sees funny side of everything	Usually sees funny side of things	Slow in response to the comic	Often has to have jokes explained	Takes everything literally

Thus, the statements are simply guides to the rater, who checks at the appropriate position to represent his best judgment. Each check-mark is subsequently converted into a number by measuring its distance from one end of the line. It is convenient to have the length of the line a round multiple of some standard unit such as 100 millimeters or 100 eighths of an inch. There is no fixed rule as to the number of phrases or as to the space between them. In some cases the rater can get a pretty good idea of the distribution of the trait from three alternatives although sometimes more are needed. If two alternatives seem logically farther apart in the actual *continuum* of the trait, they are placed farther apart in the graphic scale. One precaution in making up the statements should be mentioned. It is advisable to avoid statements involving simply "more" or "less" because these are so much subject to the interpretation placed upon them by different raters. It is much better to refer to specific situations or bits of behavior. In the above example instead of saying that the teacher had a poor sense of humor, the statement that he has to have jokes explained to him or that he takes everything literally gives the rater something specific and definite to consider.

Checklist. Some graphic rating scales have brackets above each of the alternative statements and the rater checks in the appropriate bracket. This limits the rating to four or five scores and eliminates the possibility of the finer gradations which characterize the usual graphic scale. If the rater is going to check merely one of several alternatives, there is no particular point in the linear arrangement. An arrangement like the following would be just as satisfactory:

Dependability	Check Here
Works steadily whether supervised or not	----------
Requires only occasional encouragement	----------
Works in spurts	----------
Must be given frequent attention	----------
Requires constant supervision	----------

The rater, in this case, simply checks at the end of the line following the alternative which he thinks describes this worker's dependability.

The checklist method has been extended further by not classifying the alternative statements under a given heading at all, but rather by having a large number of miscellaneous statements in random order. The rater merely checks those which characterize the person. The statements range from favorable, such as, "He is always on the job," to unfavorable, such as, "He needs to be pepped up occasionally." If success in selling, for example, is regarded as a *continuum* extending from low to high degree, any statement such as those just mentioned may be considered as appearing somewhere along this *continuum*. Its location measured from the low end of the *continuum* represents the scale value of the statement. Such a value is determined for each statement in the list. After the rater has checked the list, the scale values of the statements he has checked are totaled to get the final rating of the individual. If the rater has checked only unfavorable statements, the scale values which are added together will be small and the total rating small. If a lot of the favorable statements are checked, then the larger scale values will add up to a larger total. The process of deriving these scale values is involved.[1] It necessitates some experts such as personnel people or psychologists to rate the statements as to where they fall on the *continuum*. The statements may be sorted into an arbitrary number of piles or each statement may be paired with every other one, judgment made as to which of the two is more favorable, and the total votes for each statement computed. This latter process is arduous but scientifically is the most sound. Various procedures intermediate in difficulty are possible. The net result is a scale value for each statement which can then be used as described above. The following are a few typical statements from a checklist rating scale for salesmen together with the corresponding scale values.

---

[1] See Guilford, J. P., *Psychometric Methods*, pages 217 ff. New York: McGraw-Hill, 1936.

	Scale Value
1. He is in a rut on some of his statements about brands.	32
2. He tends to keep comfortably ahead of his work schedule.	56
3. He is a good steady worker.	46
4. He is weak on planning.	29
5. He is making exceptional progress.	69

Assignment to groups. Rougher rating procedures are used for more hasty work. The individual may be assigned to one of several groups with reference to each trait, where *A* is Excellent, *B*, Good, *C*, Average, *D*, Fair, and *E*, Poor. The letters may be assigned arbitrary numerical values for scoring, but such procedures are none too sound scientifically. For one thing, they do not give sufficiently fine gradation for some purposes. They are complicated by the rater's own interpretation of what is meant by *A, B, C*. His interpretation may be colored by some previous school experience and notions as to what was a passing grade. If the numbers are used instead of letters, the same complication may be present.

Justification of ratings. A procedure that is sometimes helpful, particularly if the raters are willing to put in the necessary time, is to require a justification of each rating. This is implemented by some such statement as, "Give specific illustrations of the behavior on which your judgment is based." For instance, if a favorable rating on ingenuity was given, the rater would describe a device which the person had constructed. This procedure has the advantage of putting the rater everlastingly on his mettle, and perhaps increasing the reliability of the ratings because of the greater care thus applied.

Nominating technique. Mention should be made of a rating technique that underwent some preliminary investigation in military organizations during the war. It suggests the sociometric technique discussed earlier (page 109) where children were asked which other members of the class they would like to have sit next to them when the seats were changed around. The frequency of votes was taken as an index of a given child's social acceptability. Naval aircraft pilots who had reached combat had had a long period of association with others in the combat unit and were familiar with their qualifications. In the nominating technique each man was requested to name four pilots known to him personally—two of whom he would be glad to fly wing-on in combat and two of whom he would not want flying wing-on him. He was also asked to indicate the reason for his choice.[2] In the instance reported the results were being used to build up criteria for evaluation of other predictors of flying aptitude, but this technique has some obvious possibilities in the way of rating scales. If each man who is involved has an equal opportunity to be chosen, the number of votes is a rough index of his effectiveness in whatever trait or traits are involved in the association. The reason given for choices would, of course, have to be handled qualitatively. This technique has not been carried very far but it has some non-military possibilities.

Reliability. Before using a psychological test, it is routine practice to determine its reliability. The same thing is true with reference to rating scales. In fact, it may be all the more important in this connection, because rating scales in general have lower reliabilities than tests. The procedure for computing the reliability is similar to that already described. Two raters may cover the same ground, and the correlation between their ratings may be computed. If they agree closely in estimating the tact of the same group of persons, then the rating scale for tact has high reliability. If only one is available, he may perform his task on two occasions, and the two sets of ratings may be correlated. A marked variation is found among raters in this respect. For instance, some foremen rated their men on a graphic rating scale on two occasions The most reliable foreman of the group had a correlation of .91 between his two ratings, and the poorest a correlation of .52. The average was .76 which is somewhat lower than the reliability usually found with psychological tests. An indirect check upon reliability may be made by taking the ratings of a given rater and casting them into a frequency distribution (*cf.* page 34). The expectation would be a somewhat symmetrical distribution like that of the normal frequency curve. If the ratings made by a given rater are badly skewed, this suggests unreliability or bias. It is then pertinent to go over some cases with him and determine whether the skewness was in his attitude or was actually inherent in the sample.

Sources of error in ratings. One of the most frequent errors in rating procedure, with consequent lowering of reliability, is termed the "halo effect." This is the tendency to get a general impression and rate the person accordingly in all the characteristics. The traditional halo sheds a luster over the individual, and, in the present context, the luster is general impression. This effect can be detected readily by correlating the traits with each other. If persons who are rated highly in alertness are rated highly in tact, cheerfulness and all the other characteristics, this halo effect is suspected. One of the possibilities of minimizing this is to rate a single trait at a time. Instead of going through the entire blank for one person and rating him on all the traits in succession, the rater takes one trait such as tact and rates everybody on that; then rates everybody on cooperativeness. This tends to break up the halo because, by the time the rater begins working on cooperativeness, he has forgotten how he rated the first persons on the list with reference to tact. In the graphic rating scale the halo effect can be decreased somewhat by staggering the items so that the favorable aspects are sometimes at the left and sometimes at the right edge of the page. If the favorable statements are all at the right, a lenient rater may uncritically make his marks straight down one edge of the page. With items staggered he finds himself giving some very unfavorable ratings and hence is led to scrutinize each item with more care.

---

[2] Vaughn, C. L., "The Nominating Technique," *New Methods in Applied Psychology,* pages 22–26. *Proceedings,* Maryland Conference on Military Psychology, George A. Kelly, editor, University of Maryland, 1947.

The reliability of a rating scale is dependent further on the actual traits involved. It has been found empirically that traits which may be characterized as *objective* yield more reliable ratings than those which are *subjective* in character. By objective is meant the fact that the possession of the trait tends to yield some objective product which can be observed subsequently by anyone. The subjective trait manifests itself only while it is in progress and leaves no subsequent observable trace. In one investigation a considerable number of people were rated by several judges, and computation was made of the agreement among the judges. Traits on which the closest agreement—highest reliability—was found included efficiency, originality, perseverance, quickness, judgment, clearness, energy. Traits on which there was poor agreement included courage, unselfishness, integrity, cooperativeness, cheerfulness, and kindness. In the first list there would often be something left to show for one's efficiency or originality or perseverence, but cheerfulness and kindliness although obvious at the time, do not leave any objective hangover. One rater might have been around when the person was especially cheerful, and another rater might have encountered him on a dull day so that the two raters could not agree. Both, however, can see the work products resulting from his efficiency.[3]

Another factor affecting reliability of ratings is the length of acquaintance. A supervisor who has seen a new man for only a few days is not able to judge him as well as after a longer acquaintance. Investigations of teachers' ratings of students yielded reliabilities averaging .67 when rating seniors, whereas the reliabilities averaged .40 in rating other students. Presumably, this difference reflects the fact that with the seniors the period of observation had been longer. On the other hand, it should not be assumed that maximum length of acquaintance is necessarily desirable. Another factor enters—the tendency to overrate a person if he is known too well. One becomes adjusted to unfavorable characteristics so that they seem less unfavorable than at the outset. Further, a supervisor may hesitate to concede that the older employees have not profited by his training, and rates them too highly or even unconsciously identifies himself with the older ones and rates them accordingly. In one instance school superintendents gave higher ratings to the older teachers, including even the ratings on physical efficiency. There may also be differences due to the actual conditions under which the acquaintance existed. A school supervisor who sees the teachers primarily in the classroom situation may give quite different ratings from an acquaintance who meets them on the golf links.

---

[3] Hollingworth, H. L., *Judging Human Character*, page 79. New York: D. Appleton, 1923.

Training raters. An important aspect of rating procedure is adequate training of the raters themselves. Unless the job is done carefully, reliability will be inadequate. Hence, one function of the training is to create a proper attitude toward the whole project. Prejudice and bias are liable to enter unless the rater takes special precautions to the contrary. He must be taught to hold the individual, as it were, at arm's length and estimate him objectively. Another aspect which needs emphasis is the necessity of giving adequate time to the rating procedure. Some raters may think it can be done casually, but after their results have been gone over with them, they begin to see that more expenditure of time is required. The bulk of the training, of course, centers around the actual experience of making ratings and having the results scrutinized by the person in charge. Undue leniency or severity and any little shortcomings may be discovered and corrected. It has been shown statistically that training along these lines actually increases the reliability of the ratings.

Merit rating. Special mention should be made of the use of the foregoing techniques in merit rating. Many organizations have the employees rated periodically by their supervisors on some such scale. These records are used in promotion, demotion, or transfer where it develops that the employee has special qualifications for a better job or lacks those for his present job. This is an aspect of the follow-up procedures discussed in the previous chapter to determine if the placement really was correct and whether some further change should be made. Merit ratings are used also to correct faults on the part of the employee. If the ratings indicate that he is careless or inconsiderate of customers, somebody may point out the fact to him to his own benefit as well as that of the organization. The ratings may also determine training needs when it is discovered, for example, that employees in a particular job lack a specific necessary skill or technique. The rating procedure also forestalls some grievances and poor morale by avoiding changes unless there is real evidence of need. When the ratings are done fairly and indicate something unequivocally, and the results are presented in the proper manner, anyone will admit that changes are justified. The term merit rating as employed in the present discussion should not be confused with its use in some Civil Service circles to indicate selection of applicants on the basis of merit rather than politics.

Practice in administering merit rating varies widely, but it is important for the program to be understood properly and appreciated by all persons concerned. Some organizations are successful in presenting the system to employees so that it appears to be a desirable feature for everyone. One company uses a little booklet explaining the system, which begins:

> After a person has been with the company for a few months, we feel that it is time to exchange ideas. We like to tell you our ideas about you and, just as important, we want your impressions of us. We think you will want to know if you are getting along all right and what your opportunities may be for a better job. As you look around, you will see that there is plenty of chance for advancement. However, advancement depends on a number of things; most of all, upon your work on the job and that's where the Merit Rating System proves valuable.
>
> You will learn from your supervisor that the Merit Rating System is designed to help you improve on your job. If there is any criticism of your work, good or bad, it is included in your Merit Rating Sheet.

In this instance a definite effort is made to tell the employees the general purpose of the procedure and to indicate how it may work out to their benefit as well as that of management. Like so many other industrial personnel devices, merit rating can be misused and disliked, but if it is administered with the right underlying philosophy, it may solve many minor problems to the benefit of all concerned.[4]

It is not worth while to present examples of merit rating scales in detail, because the technical aspects are similar to the rating procedures already described, and the novel features are simply the particular items included in a given scale and the way the results are used. A typical graphic rating scale for this purpose, for example, includes the following eight items:

---

[4] For description of some merit rating techniques see Knowles, A. S. and Thomson, R. D., *Management of Manpower,* Chapter VII. New York: Macmillan, 1943.

1. Quality and quantity of work accomplished
2. Industry and initiative
3. Dependability and integrity
4. Knowledge of job and ability to learn
5. Cooperation
6. Judgment
7. Attendance
8. Value to the division

Each of these characteristics is defined briefly followed by the usual line with the descriptive phrases scattered along it. The Industry and Initiative item in this particular scale is as follows:

Industry and initiative. Does employee apply persistence, attention, and energy to his work? Does he need constant prodding or does he go ahead with his work and follow it through to completion?	Lazy, needs much prodding.	Rather indifferent, needs occasional prodding.	Does ordinary assignments of own accord and fairly well.	Industrious and energetic. Completes suggested supplementary work.	Does far more than is expected and completes additional tasks.

Another scale in common use does not employ the graphic form, but simply requires checking in one of five columns defined as: outstanding or exceptional; good, above average; satisfactory, average; fair, below average; poor, unsatisfactory. Some of the traits to be rated are: ability to do his work, knowledge of the work, work habits, personal characteristics, special qualities, supervisory ability. In some cases the items are broken down into smaller units such as speed of work and quality of work.

Mention should be made of one study of an industrial merit rating scale using the technique of factor analysis.[5] This was a scale using five-point ratings on such items as knowledge of the job, versatility, and accuracy. The factor analysis was made by the usual procedure after getting the intercorrelations between all the items (page 209). The first factor had high loadings for over-all performance, productivity, and industriousness. It looked as though this factor might be "ability to do the present job." The second factor had high loadings for knowledge of the job, versatility, and accuracy, and might possibly be identified as knowledge or skill over and above the requirements of the job. The third factor, apparently, was mostly health. The implication of this investigation was that with this particular scale it would be just about as adequate to get a single over-all rating. This, however, does not reflect upon merit rating in general.

---

[5] Ewart, E., Seashore, S. E., and Tiffin, J., "A Factor Analysis of an Industrial Merit Rating Scale," *Journal of Applied Psychology,* 1941, 25, 481–486.

Academic Record

School progress selective. When we consider other predictors of vocational aptitude, we find there are possibilities in the individual's school record. It might be expected, theoretically, that school progress would reveal something, because the school itself is somewhat of a selective agency. Persons who cannot meet ordinary educational standards do not progress at the normal rate. The correlation between intelligence and academic achievement was noted elsewhere. In a way, school progress is a prolonged intelligence test. Thus, in employment procedures, it is well to be alert to the possibilities in data obtainable from schools.

Academic record and general success. Investigations have been made relating the school record to success in later life.[6] One approach was to take a listing in *Who's Who* as a criterion and compare people with different academic records according to the frequency with which they were listed. A study of graduates of Wesleyan University between 1860 and 1889 tabulated separately men who took honors, those who made Phi Beta Kappa, and all others. The results appear in the first column of Table 27. Those with high academic achievement made *Who's Who* with greater frequency. The class of 1911 at Harvard University was studied in the same way, and although 14 per cent of the students as a whole made *Who's Who,* 30 per cent of the Phi Beta Kappa's did so. In this same group, moreover, the Phi Beta Kappa's averaged $6,000 in subsequent salary, and the others only $4,000. Similarly, the graduates of a technical institute for mechanical and electrical engineering were divided into four groups on the basis of academic marks. Those

---

[6] Nicholson, S. W., "Success in College and in Afterlife," *School and Society,* 1915, 2, 229–232; Starch, D., *How to Develop Your Executive Ability,* page 24. New York: Harper's, 1943.

TABLE 27

Academic Progress and Subsequent Achievement *

	Percentage in Who's Who		*Average Salary*
	Wesleyan	Harvard	Harvard
Honor men	48		
Phi Beta Kappa	31	30	$6,000
Others	10	14	$4,000

* Nicholson and Starch

in the lowest fourth made only 77 per cent as high a salary subsequently as those in the highest fourth.[7]

A study was made of employees in the Bell Telephone System, relating their scholarship in college to their subsequent salary in the organization. The data appear in Figure 13. The abscissa of the curve represents the number of years since graduation, and the ordinate the salary in terms of the median or average of the entire group. Curves are given for four different types of students. Those in the highest tenth in academic grades showed a marked increase in salary through the years since graduation, finally reaching a point about 50 per cent above the average of the group.

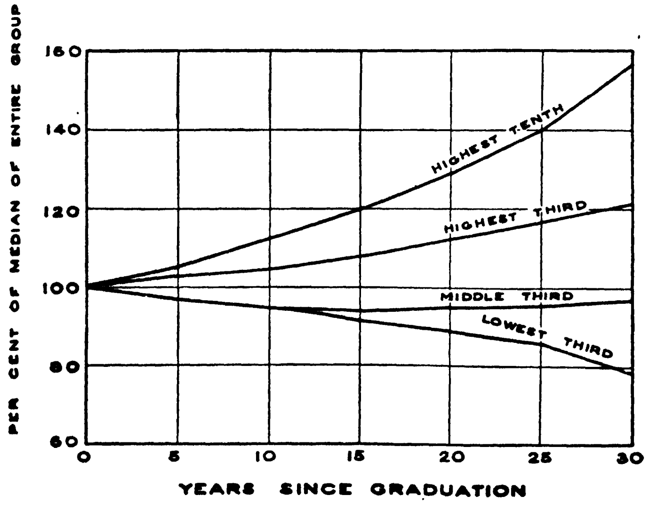


Figure 13. Scholarship and Salary in Bell Telephone System.

---

[7] Hollingworth, H. L., *Vocational Psychology,* page 198. New York: Appleton-Century, 1916.

Those in the lowest third academically went in the opposite direction.

Amount of education. A frequent item on an application blank is the last grade of school which the individual finished. This is of significance in some cases. If, for example, the job requires a knowledge of fractions, it is simple enough to determine if the applicant completed the grade in school in which fractions were considered, and if he did, it can be assumed that he has been at least exposed to fractions. With compulsory education and everyone attending school until a certain age, the grade reached may be diagnostic. If two individuals have both presumably attended school eleven years, and one finished the third year of high school and the other only the seventh grade, this tells something about their rate of progress and indirectly their native capacity. The correlation of years of schooling with occupational criteria is sometimes small, perhaps because special aptitudes are more important than intelligence; but if variables on an application blank are being investigated, it is simple to check the validity of school grade completed.

Special subjects. Occasionally the academic record in some special subject is of significance; there is the obvious case of the student who did especially well in mathematics having a better chance of success in work requiring computation. If the student had some leeway in electing different subjects, his choices reflect interest, or ability, or both. Usually persons select subjects in which they are fairly proficient, so those who have voluntarily chosen mathematics or natural science stand a little better chance in engineering occupations.

Tests superior to record. Academic records should not be used to the exclusion of other measurements. There are ample sources of unreliability in school records. A youngster who makes good grades in a small high school taught by someone who is a friend of his family may have quite different ability from a youngster who makes similarly good grades in a large, more impersonal high school where his family does not rate at all. A sample of applicants might include both kinds of people. Moreover, there is empirical evidence that if it is desired to check on proficiency in some school subject such as algebra or geometry, a better check can be made by giving a specific achievement test, provided it is not too short, than by considering the academic record. An investigation was made of the comparative validity of high-school marks and of specific tests for predicting success during the first two years in an engineering college.[8] The high-school grades in algebra correlated with success in the engineering college to the extent of .21, whereas a three-hour test in algebra, given at about the time of entrance to college, had a correlation of .30. Corresponding figures for geometry were .22 and .35, for physics .25 and .36. For a number of subjects the average validity for the high-school grades was .28 and for the special achievement tests, .48.

---

[8] Thurstone, L. L., "Intelligence Tests for Engineering Students," *Engineering Education*, 1923, 13, 263–318.

Previous Work Experience

Same job. It is universal practice to ask an applicant about his previous work. He may have had experience in the same type of work as that projected, or in some related work which would have a bearing on prognosis in the proposed job. In the former case the connection is quite obvious. Empirical evidence on this point is not lacking. With a sizable group of insurance salesmen, a correlation was computed between their production in the first year of their employment and the second year. The coefficient was .72 and indicates that previous success in selling insurance is predictive of subsequent success in that same type of work.[9] It is not always as clear-cut as this, however. The efficiency during the sixth month of service of a group of billing machine operators was correlated with efficiency in various previous months. For the first month the correlation was only .20, for the second, .48, for the third, .60, and for the next two, .76.[10] If the sixth month's production is regarded as the ceiling, which it was desirable to predict at the outset, the first month's production would not predict it with any accuracy; the second month would do so to a fair degree, and the third month quite well. It is unsound to assume that initial experience in *any* job is diagnostic of later success in that job. It is necessary to ascertain empirically how big a sample of initial experience is required before it is possible to predict with some accuracy.

Related jobs. Experience in related jobs may throw light on success in a proposed one. In the light of the earlier discussion of transfer of training (page 146), the crucial consideration is the actual amount of relatedness in the two jobs, that is, the extent to which they include identical elements. If both of them require hitting things with hammers, there would at least be that particular skill which could transfer from one to the other. A sales organization studied its personnel with reference to previous occupation and found that the most successful salesmen had previously been in professional work, secondly, in business for themselves, thirdly, in retail selling, fourth, in outside selling, and fifth, in clerical work.[11]

---

[9] Goldsmith, D., "The Use of the Personal History Blank as a Salesmanship Test," *Journal of Applied Psychology,* 1922, 6, 148–155.

[10] Kornhauser, A. W., "A Statistical Study of a Group of Specialized Office Workers," *Journal of Personnel Research,* 1923, 2, 103–123.

This same point is reflected in some psychometric projects dealing with clerical workers. Instead of developing separate tests for private secretaries, coding clerks, and bookkeeping machine operators, effort was made to derive a test of "general clerical ability." This is not as desirable as having separate tests for each specific job, but it did result that persons who did well in the general clerical test stood a fair chance of success in any of these fields. Obviously there was some similarity between the different clerical occupations.

Job Families

Nature. Special mention should be made of the job family as a device designed to implement evaluation of previous occupation as prognostic of success in a given type of work. The developmental procedure is based on estimates rather than actual tests of the common elements in the jobs, but nevertheless it is done systematically. A job family consists essentially of a list or table of occupations related to the one at the head of the list, usually called the base job, with reference to aptitude, ability, skill, knowledge, processes, materials used, tools, machines, and equipment. If two jobs require dexterity, a person who has manifested sufficient dexterity to hold the first job will show that same dexterity in the second job. If both jobs involve working on heavy canvas, some transfer of skill from one to the other is to be anticipated. The tables are based on estimates of these common elements, secured in a careful job analysis. The actual table starts out with the base job followed by a group of very closely related jobs from which workers could shift to the base job with little difficulty. Then follows a group of less closely related jobs where more training would be necessary when shifting to the base job. Other more remotely related jobs follow.

Use. The job family is useful in finding prospects for a job who do not have to start from scratch, but whose previous experience may stand them in good stead. In some cases there are skills that will transfer directly, for example, the use of a screwdriver. In other cases it is a matter of similar aptitudes such as good motor coordination. This procedure is useful when tests are not feasible. Of course, it would be more desirable to measure coordination rather than simply assume it from success in the previous job. In the war period when skilled workers were scarce, job families were useful in locating sources from which to recruit employees. If a lot of tool makers were needed and no experienced ones were available, it was a question of finding somewhat related jobs from which persons could be converted to tool making more readily than if they lacked that previous experience. When a war plant was being established in the Northwest, it developed that the principle source from which to recruit machine workers consisted of farmers and miners. It was necessary, then, by job analysis and the procedures ordinarily used in setting up these job families, to determine which would be the more profitable source from which to recruit machine workers.

---

[11] Kenagy, H. G. and Yoakum, C. E., *The Selection and Training of Salesmen*, page 161. New York: McGraw-Hill, 1925.

Development of job families. The basic data in developing these instruments consist of job analysis schedules and worker characteristic forms which are filled out by an analyst trained in this type of work. He observes the job, talks to supervisors and workers, and sometimes even tries the job himself. He follows a systematic schedule including such things as skills, knowledge, processes, materials, and tools. He also estimates necessary characteristics of the worker, such as strength of hands, judging speed of moving objects, keenness of hearing, devoting attention to many items, emotional stability. This procedure is carried out for a large number of jobs prior to the actual process of building up the families. After all the data are available for a given job, they are punched into a card for the final record. Similar cards for all the jobs are prepared. They are sorted mechanically—the method depending on the type of punched-card system employed. Starting with a base job for which it is desired to build up a family, the first decision is what characteristic is absolutely the most essential. Suppose it is finger dexterity, then the cards are sorted on the basis of finger dexterity, and all the jobs where finger dexterity is not involved are set aside and further analysis confined to the remainder. The next most important thing in the base job is, say, blueprint reading, and so all the cards, that is, jobs, that do not involve blueprint reading are removed. The next most important thing is keenness of vision, and all jobs which do not involve it are discarded. The remaining pile of cards represents jobs which require dexterity, blueprint reading, and keen vision. Perhaps these are the only three things that are absolutely essential for the base job, so that any of the jobs in this pile would be of some value in furnishing recruits for the base job. Therefore no more jobs are discarded entirely, but now the problem is to arrange the residue roughly in order of relatedness to the base job. This must be done on the basis of other characteristics than the three mentioned thus far. So the cards are sorted again on the next most important characteristic, such as experience in working with sheet metal, and the jobs which do not include this are put in the lowest category which might be Table 5. When the remaining cards are sorted for the next most important characteristic, say, judgment of small distances, jobs lacking it are put in Table 4. This procedure is followed until finally Table 2 comprises jobs which have the most in common with the base job. If it is desired to recruit persons for the base job, effort should be made to do so from jobs in Table 2; if none are available, from Table 3, and so on down the line. The further it is necessary to go, the greater the amount of training that will be required because of the lesser similarity between the two jobs.

Content of table. A job family consists of a base job in Table 1, closely related jobs in Table 2, less similar jobs in Table 3, and so forth, sometimes going as far as ten tables. A few excerpts will be given by way of illustration from a job family for *tool grinder operator.* This job involves, among other things, sharpening cutting tools, jigs, and fixtures with a modified universal grinder using variously shaped abrasive wheels. It involves mounting the abrasive wheel and feeding the tool which is being ground against the abrasive wheel by turning another device, which moves it forward automatically. In Table 2 is a list of occupations which involve precision grinding of metal parts (not tools), usually according to blueprints and requiring dexterity, eye-hand coordination, perception of form, muscular discrimination, and ability to set up and adjust the machines and to use measuring devices. Among the occupations listed in Table 2 are one variety of machinist, die maker, die sinker, saw filer. Obviously these jobs are close to the base job, and it would not take very much additional training to shift a person over from grinding metal parts to grinding tools. Table 3 comprises occupations involving precision grinding of glass, requiring manual dexterity, eye-hand coordination, and perception of form similar to those in Table 2. However, the jobs involve working on glass rather than metal, so a little more difficulty would be experienced in shifting over to tool grinding. These jobs include edge grinder, lens grinder, lens polisher. Table 4 includes occupations which involve setting up and operating machines for accurate cutting, turning, planing, threading, reaming, and milling of metal, requiring manual dexterity, and so forth, like Table 2, and including such occupations as watch repairman, engine lathe operator, mold maker, milling machine operator, spinner. These jobs involve working with machines but do not specifically involve grinding. Table 5 includes buffing and polishing metal where the actual manipulation is somewhat like that involved in grinding (silversmith). Table 6 includes buffing and polishing materials other than metals—lapidary, marble polisher, belt sander. Table 7 is like 4 except that it does not involve metal but wood or glass—for example, cabinet maker, bench carpenter, glass driller. The decreasing degree of similarity further away from the base job is obvious.

Military use. Job families were used extensively in assigning persons to military specialties during the war; putting the military specialty as the base job followed by families of civilian occupations which were related to it and *from* which the specialists might be selected. The effort was to capitalize on the soldier's previous civilian experience. Similar tables were used in the war industries. The same procedure was adapted to demobilization in order to find the best civilian job for a person with specialized military experience. Here the base job was the military specialty, and the subsequent tables included jobs *to* which the specialist might transfer. Some of these tables give not merely the jobs in the family but also some indication as to additional training that might be needed. For example, for a person who had been a parachute rigger and repairman in the Air Forces the jobs in the first table include foreman (parachute repair), parachute inspector, beef pack inspector, canopy stringer. There is further indication that to undertake any of these jobs after having had the military experience as parachute rigger, one would merely need brief on-the-job training to get familiarity with the duties of the particular job. The next items are mattress finisher, hemmer, sewer (hand), cushion man, side-stitching man. Obviously, these jobs involve working on fabrics and require brief on-the-job training in the use of hand-sewing tools peculiar to the specific job.

It is to be noted that job families can be devised to operate in either direction. The base job may be the one for which it is desired to recruit people, or the base job may be one from which it is desired to place them. In the above examples tool grinder operator was of the former type and parachute rigger of the latter: the former involved finding the best sources from which to recruit tool grinder operators; and the latter involved finding the best civilian outlets for a person who had military experience as a parachute rigger. A given table cannot be used satisfactorily in both directions because of the technical way in which it is constructed, but it is feasible to build tables for operation in a desired direction.

Limitations. A few cautions should be observed in the use of job families. Within a given table there is no hierarchy of occupations. In the illustration for tool grinder operator, there is no choice in Table 2 between machinist, die maker, and die sinker. The procedure just does not grade that finely. Moreover, the table is built up for the average job as it is ordinarily found. There sometimes are specific differences which cannot be covered by a general table. For example, a railroad ticket office worker in the Grand Central and one in Pompanoosic, have distinctly different jobs although they both sell tickets. The table takes no account of special requirements set up by an individual employer: some employers, for example, prefer persons of one sex. Moreover, the location in the table is not based on degree of skill. Jobs in Table 2 are not necessarily more skilled than those in Table 3. For instance, in a family for mechanical draftsmen which appears in Table 1, loftsman, down in Table 5, is actually a more complex job and involves higher pay than mechanical draftsman. This notion of job families is not a brand new one anyway. Many employers have used something of the sort all along and in selecting workers for a certain job have favored those with previous experience in a similar specific job. However, the job family systematizes the procedure.

Personal Data

General approach. There are possibilities in the kind of personal information available on an application blank or obtainable in an interview. It is conceivable that such things as age or marital status might be significant with reference to success in a proposed job. The obvious approach is to secure such information and then make an item analysis of each minor variable to determine its validity. If a large proportion of the married salesmen are successful and the single salesmen, on the whole, do not sell very much, this item has some validity. Such validity seldom is as high as that found with aptitude tests, but still it helps.

Stature. There are obvious instances in which a person's size is important, for example, with work that is heavy or involves reaching up to considerable height. There are more subtle possibilities, however. It has been alleged that tall people are more successful salesmen because they can dominate the prospect. Occasionally a sales manager actually recruits personnel six feet in height. When this point is investigated statistically, the results are equivocal. In one instance no appreciable correlation was found between height and actual sales.[12] This was not the whole story, however, because salesmen as a whole may be somewhat taller than the average prospect. In the first World War, the average height of the men in the army was 67.5 inches. For seven different groups of salesmen the average height ranged from 68.8 to 69.6.[13] Combining this finding with the other just cited it appears that height is an advantage up to a certain point and beyond that it makes little difference. The matter of weight is more dubious because of the age factor. Many persons put on weight in middle age, and it might even reach the point where weight handicapped the salesman in getting around.

---

[12] See Kitson, H. D., "Height and Weight as Factors in Salesmanship," *Journal of Personnel Research*, 1922, 1, 289–294.

[13] Burtt, H. E., *Principles of Employment Psychology*, page 421. New York: Harper's, 1942.

Age. Considerable significance is attached to age in some employment situations. Many organizations have a limit below which they will not hire a youngster. In most fields there is a retirement age. The notion is that persons outside the limits are ineffective in the type of work under consideration. When actual occupational performance is correlated with age, the coefficients obtained are usually small. For clerical workers in the Civil Service, for example, the correlation was only .06.[14] This may not be the entire answer, however, because even though there is no direct relationship between age and efficiency within the normal range, it may well be that only within certain age limits is there the greatest efficiency. The situation is analogous to that mentioned in the previous chapter, whereby in some occupations an upper and lower critical score in intelligence is desirable. There are, for example, indications that salesmen in the middle-age range are the best producers. Only 11 per cent of a group of superior salesmen were below thirty years and only 10 per cent over fifty. Similarly, in an insurance company the best producers were found between thirty-five and fifty.[15]

There is also a factor of stability as related to age. A tabulation was made of the average number of weeks worked by employees who did not remain permanently in certain manufacturing occupations. There was high turnover in the early years up to about twenty-five; then considerable stability for a while, with a little drop in the late thirties or early forties; and finally marked stability in the older years. The results may be interpreted in terms of the general instability of youth at the outset seeking a vocational objective, then the period of heavier family responsibilities, then a period when the children were grown and it might be in point to take one more look to be sure that this was the final vocational objective, and then ultimately settling into the occupation where it would be impossible to improve one's self by a change because of advanced years. Findings of this sort must be interpreted in terms of the labor market. In a period of unemployment people who would ordinarily be unstable and trying various vocational objectives, will persist in anything which is available.

---

[14] Thurstone, L. L., "A Standardized Test for Office Workers," *Journal of Applied Psychology,* 1919, 3, 248–251.

[15] Kenagy, H. G. and Yoakum, C. E., *The Selection and Training of Salesmen,* page 217. New York: McGraw-Hill, 1925.

Marital status. Many employers prefer married men, and especially those with dependents, because greater occupational effort is required on the part of the worker with heavier responsibilities. About all the available data on this point deal with sales people, and corroborate this assumption. In one instance 74 per cent of the successful salesmen were married, but only 57 per cent of the unsuccessful ones. In another study from 61 to 93 per cent of the superior sales people were married, whereas the per cent that were single ranged from 7 to 39. It is necessary in such studies to allow for the factor of age, because with increasing age, up to a certain point, there is a higher probability of marriage, but even so the trend persists. The story is similar with reference to dependents. In a group of superior salesmen the average number of dependents was 2.5. Further studies indicated that one or two children was the most favorable number, and with more than that the effectiveness of the salesman decreased. Some other factor entered at this point. The general results reflect the degree of responsibility and resulting motivation.

Combination of factors. It is possible to take a number of these items of personal information, determine roughly their validities, and then combine them into a weighted score which will have predictive value. It is even feasible to work out a regression equation. The following is an instance:

$$X_1 = 3.2X_2 + 9317X_3 + 106X_4 + 5534X_5 + 26880$$

where X_1 is production in selling, X_2 amount of insurance carried, X_3 number of clubs to which he belongs, X_4 age, X_5 number of dependents. This weighted score had a validity of about .40.[16] Several of the large insurance companies have pooled funds for a cooperative research venture which has analyzed this type of material and provided a manual based upon it, which weights various items of personal history statistically. In some instances the weighted personal history proved more valid than any combination of tests. This was true for salesmen over twenty-five years of age, but the reverse was the case with those under twenty-five, presumably because they did not have much personal history. For managers in the insurance field the personal history was superior to any other predictors. However, it is not safe to generalize too much. In studies of sales persons made by the different companies, the weighting given to the same item by the different companies is not the same. In one manufacturing organization, for example, the number of dependents which received the greatest weight in the equation was one, whereas in an insurance company it was two, and in a cooperative research by a group of insurance companies it was three or four. Similarly, in one project, membership in a considerable number of social organizations was most predictive, whereas in another place only one or two memberships was most favorable.[17] The upshot is that these personal items must be investigated as predictors in the specific setting where they are to be used.

---

[16] Manson, G. E., "What Can the Application Blank Tell?" *Journal of Personnel Research,* 1925, 4, 73–99.

Recommendations

Difficulties. It is common practice to ask applicants for recommendations from previous employers. Unfortunately, recommendations are often "sealed with a shrug and opened with a smile." All too frequently, they are written by someone who is busy with other matters and does it as mere routine. Those who write numerous recommendations are prone to slip into generalities—"fine moral character"—which are meaningless and have little validity. The relationship between the recommender and the applicant is significant because a person is inclined to rate too highly people in whom he is interested or with whose family he is friendly. It is important to note the conditions under which the recommender has been able to observe the applicant. The school teacher has seen the young person only in school and knows little about his outside social behavior, or the clergyman sees him only on Sundays when he is on his good behavior.

Open letter. The value of the recommendation depends on the method by which it is obtained. The worst practice is the open letter where the recommender makes statements and hands them to the applicant to present to the prospective employer. This procedure doesn't mean a thing because the recommender will not be frank about undesirable characteristics in a letter which he hands to the individual. He certainly would not write: "To Whom It May Concern: John Doe is of questionable integrity," and then give that letter to John.

Letter directly to employer. It is much more satisfactory for the recommender to mail his letter directly to the person interested in it, so that it does not go through the applicant's hands. Then he can be confidential and discuss both favorable and unfavorable points. After all, it may not be to the applicant's interest to gloss over his undesirable characteristics because they may spell maladjustment on the proposed job. It would be better for him not to attempt that job at all but to get into something where his personality would not handicap him.

Recommendation blank. The best procedure, by all odds, is to have the prospective employer send either an inquiry or, better still a form or blank, to the recommender, asking him for the particular kind of information which he wants. This has the merit that the items about which information is secured will have some validity because the employer knows what characteristics are especially important for the job in question. The inquiry may take the form of a letter asking for information about a number of characteristics, and if the recommender is cooperative, he writes a brief paragraph on each of these. It is usually preferable to provide a blank similar to a checklist on which the information can be recorded with a minimum of writing. Someone who is disinclined to sit down and write a lengthy communication, particularly if he has to do a lot of them, will react favorably to a blank in which he makes a few check-marks here and there and jots down a few words. He may really give better information in this way because everything is specific and he can make his decisions quickly and effectively. Such a blank sometimes includes a simple rating scale covering such items as manners, ambition, application, persistence, popularity, with several alternatives after each of these words which are to be checked. The point is that if the rating blank is easy to execute, better cooperation on the part of the recommender will be assured and hence more reliable results. When they are properly handled, recommendations have considerable merit. In the form of an open letter, they are worthless.

---

[17] Poliak, S., "Picking Better Salesmen," *Printers' Ink*, January 26, 1945, 210, 17 ff.

Employment Interview

General unreliability. The interview is almost universal employment practice and is stressed especially for jobs which involve contact with customers. In addition to locating undesirable characteristics that may not come out in tests or recommendations many employment men feel that they can size up the applicant and form a valid judgment about his probable success. It is not difficult to demonstrate empirically the unreliability of this assumption. One striking instance was found in connection with applicants for sales positions in an automobile organization.[18] It happened that a dozen sales managers from all over the country were having a meeting in Chicago at the time when the local agency was putting on some more salesmen. They had rounded up fifty-seven prospects through classified advertising, and someone hit upon the bright idea of letting these twelve sales managers interview the applicants and of determining the agreement between these interviewers. Each applicant was interviewed by all twelve managers. They used the procedures which they would have employed in their own locality and made a ranking of the fifty-seven applicants. It is not worth while to present the results in detail, but there were striking discrepancies. One applicant was ranked 6th by one sales manager and 56th by another. Another applicant was ranked from 9th to 54th. In one instance the applicant was rated at opposite extremes by two different managers. This may be an extreme case, but it is disquieting to find such a discrepancy among the ratings of sales managers who were presumably successful enough in their own territory to be at the head of a local organization.

---

[18] Hollingworth, H. L., *Judging Human Character*, page 65. New York: Appleton-Century, 1923.

Causes of unreliability. Some of the reasons for unreliability in ratings of this sort are known. For one thing, the average interviewer is prone to use certain personal generalizations of his own. He may have built these up on the basis of inadequate data. Perhaps he found that a few people with red hair were unsuccessful in this particular kind of work and immediately generalized, forgetting all the brunettes who were unsuccessful. Although he might hit upon some valid item by accident and even develop a few key questions to bring it out, this validity would not be known unless some empirical evaluation was attempted. Another source of error is the frequent assumption that habits are general. If a man is neat in physical appearance, it is often assumed that he is going to be neat in everything else including his work habits, which may not be the case. Some interviewers may be thrown off by the fact that the applicant is nervous and ill at ease. An experienced interviewer knows how to make allowance for this or, better still, how to break it up and establish good rapport.

Improvement. It is possible to improve interviewing techniques. The interviewer will do well to limit himself to information that is not otherwise obtainable. It is a waste of time to go into detail concerning the academic record if a transcript of that record is on the desk. It is also desirable to have several interviewers pool their results. Statistically the average of several observations is better than a single one and pooling the interviewers tends to offset minor discrepancies. The desirability of securing good rapport at the outset should be emphasized. A skilled interviewer does this anyway and gets the applicant in the proper attitude so that he will not be unduly disturbed and will give frank answers to the questions. The interviewer should put most stress on questions or items which have been demonstrated to have some validity. A query as to how much insurance the man thought he could sell the first year might have some validity as indicating his general level of aspiration. However, if experience has proved that this kind of a question does not elicit valid answers, then it is pointless to ask it. There may be certain traits or characteristics which the interviewer should watch for during the interview. There may even be cases in which a "stress interview" is desirable.

This is a situation in which something apparently is at stake, and the interviewee is deliberately put under pressure to see how he behaves. This technique gets over more into the clinical field and may be unsatisfactory unless the interviewer has considerable clinical insight. As a matter of fact, it is possible to improve the reliability of interviews by approaching them scientifically. In one instance an interviewer's blank was provided, with standardized questions about previous experience, family, social and personal history. After some experience with this blank, the correlations between the results of two interviews was about .71.[19] In a military project three hours of training given to officers in techniques of interviewing and rating increased the validity of their estimates from .30 to .60.[20]

Implementing the interview. It is possible to improve the interview somewhat by various supplementary devices. One device is to provide some kind of an interview form which will highlight the important things which will be brought out. The Psychological Corporation, for example, provides a manual for interviewers which includes experience, training, manner, appearance, sociability, maturity, and leadership. The blank may actually suggest questions to be asked, although more frequently it simply calls attention to the particular points which should be investigated. The interviewer uses his own questions or observational methods but does get at the matter of experience, training, and manner. The blank used by a manufacturing company involves such items as capacity for day-to-day plugging, money mindedness, capacity for social and emotional adjustment, physical energy, vitality, articulation, reliability.

Another possibility is to provide the interviewer with a rating scale which he executes during or after the interview. If he is asked, for example, to evaluate how well the applicant expresses himself or how much initiative he shows evidence of having—whether he is a self-starter—it is possible to implement the evaluation by a scale covering these items. The technique of the rating may be similar to that described earlier in connection with other rating scales. The only difference here is that the applicant is a stranger when first interviewed, and judgment has to be formed in the relatively short period involved in the interview. Obviously, certain traits cannot be evaluated at all under these circumstances. But there are some things which can be so evaluated, and it is just as important to get the results in systematic fashion as in the case of the rating scale made out by an acquaintance. The man-to-man rating scale is feasible although a bit cumbersome and time-consuming. Some interviewers have master scales on their desks, concealed by a book or something, and glance at them from time to time during the interview to compare the applicant with persons on the master scale so that a subsequent judgment can be made. Some graphic scales or checklists are used similarly. For example, the item mentioned about how well he talks has been broken down into alternatives such as "very good expression," "forceful speech," "deliberate," "fairly fluent," "very poor expression," and "talks little and doesn't express self well"; or the item about initiative might have the following points: "has done little or nothing on his own," "only once or twice has he shown any initiative," "has considerable initiative but only when certain interests are involved," "has often shown a real desire to get ahead." A rating scale of this sort can be executed during the interview, or immediately after, or both and can yield quantitative scores like any rating scale. These scores may even be weighted and included with other available data in the over-all quantitative picture, on the basis of which the decision is made whether to hire the person.

---

[19] Hovland, H. C. and Wonderlic, J. C., "Prediction of Industrial Success from a Standardized Interview," *Journal of Applied Psychology,* 1939, 23, 537–546.

[20] Bingham, W. V. in an Unpublished Lecture in 1945.

A recent development is an inconspicuous observer in the background pushing buttons to indicate on a moving tape when the applicant is speaking or otherwise actively participating and when he is passive. The interviewer follows a standard pattern including a period in which he tries to talk the applicant down and a period in which he refuses to make conversation. The tape is analyzed to indicate dominance and general activity.

Other functions of an interview. The employment interview always has functions other than merely deciding whether or not the applicant has the qualifications for the job. In addition to getting information about the individual, the interviewer should give him information about the company and the job. This all relates to the matter of morale. If the employment interview is properly handled, it may encourage a favorable employee attitude toward the organization, because this initial impression may have an important carry-over. Certain things about the job should be explained, even the unfavorable aspects. It is unfortunate if a man undertakes a position under false pretenses. He may anticipate a nice cozy job in a warm garage, but find later that he has to go out and lie down in the snow under a car. He should know the worst from the outset so that there will be no subsequent disillusionment. A still further function of the interview is to provide emotional release by giving the applicant a chance to talk things out. Therapeutic interviews have been discussed elsewhere. Although this aspect develops only rarely in the employment interview, if an applicant shows a little maladjustment but appears otherwise to be a person who is really wanted in the organization, some of the therapy may begin in a small way in the initial interview. At any rate, this interview should not be limited entirely to deciding whether to hire the person, but should be a part of the whole induction process.

Job Analysis

Purpose. The last of the miscellaneous employment devices to be discussed is job analysis. It aims at providing complete data for the employment man who has to evaluate the applicant and answer all his questions. This necessitates an accurate description of all jobs under consideration. It is even difficult sometimes to match the title of a job mentioned by the applicant with jobs for which there may be vacancies in the organization. For instance, an applicant who indicated in his personnel blank that he was a pipe-cutter was uncritically assigned to a job involving cutting threads on large, iron pipes. As a matter of fact, he had been a carver of meerschaum pipes. The job analysis involved in the present connection is more comprehensive than that discussed previously in connection with determining what employment tests to validate. The procedure may be used for that latter purpose, but goes much beyond requisite aptitudes. Such analyses also have been useful in working out definitions of occupations such as appear in the *Dictionary of Occupational Titles* and have facilitated the building up of job families.[21]

Methods. The analysis is made, of course, by personnel trained for the purpose. Previous experience in observing and interviewing is advantageous. The method generally involves observation of workers, supplemented by interviews with workers and supervisors. The analyst takes his cue from forms or schedules provided on which he records the results of the analysis. He does not necessarily follow this schedule but takes notes which ultimately can be organized in the desired fashion. This general form may also be supplemented by further blanks, for example, one dealing with the physical characteristics necessary in the job, such as walking, climbing, jumping—information which is particularly useful in placing handicapped workers. Another useful device is a "worker characteristics" form of the type developed by the War Manpower Commission. This blank includes a list of characteristics such as working rapidly for long periods, dexterity of fingers, strength of back, estimating size of objects or direction, arithmetic, memory for names, personal appearance. These and many other characteristics are rated by the analyst according to the "amount of each characteristic demanded of the worker in order to do the job satisfactorily." The analyst may rate the characteristics in three grades, *A, B, C*. *A* would mean that the characteristic is so important that not more than 2 per cent of the general population would have enough of it. The grade of *B* means that that characteristic would be possessed by the next 28 per cent.

---

[21] For a general review and bibliography see Zerga, J. E., "Job Analysis; a Résumé and Bibliography," *Journal of Applied Psychology*, 1943, 27, 249–269.

Example. A schedule made out by the War Manpower Commission in Ohio for jewelry polisher gives the preliminary information about titles and code numbers at the top. Then comes a job summary which is basic, and reads as follows: "Hold pieces of costume jewelry and manipulate them against the surface of laminated muslin, flannel, and wire polishing wheels which are power rotated to produce polished surfaces of various types on them before they are plated and painted." This summary is prepared after the rest of the analysis has been done, but actually appears in the first part for quick reference. In this particular organization it is recommended that action verbs such as "hold" and "manipulate" be used. The next item is the minimum qualifications including such things as age, sex, physical characteristics (agility), education (whether one needs to speak, write, or read English, the amount of school required, and whether one needs to know fractions), and previous experience. In the present instance the jewelry polisher requires for his minimum qualifications an age from eighteen to sixty, strong dexterous hands to hold small objects that are being polished, no particular qualifications regarding English or education and preferably six months of experience at this particular job.

The next item deals with the relation to other jobs and may tie in with some job family. It may take account of the fact that some jobs can be broken down into smaller ones. Lines of promotion are indicated. Note is then made of supervision, both given and received. In the present example the incumbent can be promoted from wash boy or jigger and may be promoted to foreman of the polishing room. He receives immediate supervision by a foreman and gives none. The job is seasonal, having a peak from August to December. The first page of the schedule gives the above information which is most crucial for quick reference on the part of an employment office person. Subsequent pages of the schedule go into more detail on certain points. The work performed is described with reference to the duties including what he does, how he does it, and why. This itemization of the work may include a breakdown according to movement, skills, knowledge, and judgment. Indication is often given as to the percentage of the time spent in each part of the operation. For example, in polishing about 10 per cent of the time goes into preparation, 85 per cent into the actual polishing, and 5 per cent into making up wooden forms to hold the items. The degree of skill on each part is also rated, in this instance, on a three-point scale.

The next section deals with equipment such as polishing wheels and compounds, the materials used, the surroundings under which the work takes place with mention of the noise and the hood over the machine to draw off dust. Hazards are mentioned such as the danger of burning the fingers against the wheel. Placement aids follow, giving some basic requirements such as polishing experience and knowledge of compounds, and variable requirements such as what articles are to be polished in this individual case. Finally, there is a definition of some of the technical terms used, in case the person handling this schedule is not familiar with the job first hand.

The relative emphasis on the different features of this job analysis schedule will depend much on who is to use it, and it is well to contact such persons in advance to determine their particular interests. The employment division needs to know about working conditions in order to help place persons who are handicapped. The training division is interested in the specific knowledges that are required for proficient operation. An instrument of this sort may be very useful in the employment office. Some of the things discussed earlier regarding psychological predictors may be worked into the section dealing with requirements, along with statements about skill and experience. They may well include critical scores in aptitude tests or other predictors which have been determined statistically to have some validity.

Job evaluation. Mention should be made in this connection of a somewhat related problem, namely, job evaluation. This is not an employment technique, but deals with subsequent adjustment of the employee, particularly with reference to financial aspects. It often attempts to set equitable rates on a comparative basis, that is, assuming that the payroll will be a certain given amount, what is the most equitable way to distribute that amount in proportion to the actual contributions made by the workers in different jobs? It would be possible to have a committee simply rank the jobs on a basis of "value to the organization," or to establish certain rough classifications and simply put the job in one of several classes, and pay at the same rate within a class. It is much better to break the job down in more detail. Point systems are frequently used in which the job is divided first of all into certain factors (skills, physical factors, responsibility, mental factors, working conditions), and certain points are allotted for each factor. For example, a certain number of years of education might count one point, and more education, two points. In another approach something analogous to a man-to-man rating scale is devised, that is, a job comparison scale in which ten master jobs are fitted into columns for various factors such as skills and physical requirements. Each job is listed opposite some rate or standard on that given row. Then, when any proposed job is rated in a given factor it is simply compared with the other key jobs listed under that factor and assigned a value similar to them. The total points or the total weighted score derived from any of these procedures can then be fitted into the total wage structure.

These are some of the miscellaneous techniques used by the employment psychologist in attempting to predict success on the job. Although they are not as valid in most instances as the psychometric approach, they, nevertheless, are sometimes useful in lieu of such an approach when it is not feasible and as a supplement to it when they can combine with it and increase the validity.

Summary

In some employment situations aptitude tests are not feasible and resort must be had to other predictors. Rating scales constitute one such predictor. The items to be included in a scale are determined on the basis of the judgment of experts who are called upon to weight the traits selected by the initial judgments. The traits must be defined so that all raters will be dealing with the same thing.

The man-to-man rating scale is based on the construction of an individual master scale for each trait. Each master scale consists of the names of a few persons known to the rater who cover the entire range of the trait in question. The rater makes man-to-man comparisons between the individual being rated and the members on the master scale. This procedure has the unique advantage that errors are not introduced by the mood of the rater because any unusual attitude will affect his opinion of the people on the master scale as well as his opinion of those being rated.

The graphic rating scale requires the rater to check along a line according to descriptive adjectives or phrases. The rating can be converted into an index by measuring the distance of the check-marks from the end of the line. This type of scale is simple and easily understandable. The checklist procedure consists of a considerable number of statements which are checked to indicate whether they characterize the applicant. A scale value for each statement is determined by having experts evaluate the statements with reference to where they exist on a *continuum* of the ability for which the scale is used as a predictor. Scale values for all the statements checked are simply totaled to yield an over-all rating.

It sometimes improves rating scales to require the rater to give specific illustrations justifying his rating. The reliability of scales should be determined by correlating the ratings of the same persons made by two raters or correlating two sets of ratings made by the same individual. In general, the reliability of rating scales is lower than that of tests.

A frequent source of error in rating procedure is the halo of general impression which causes unduly high intercorrelations between ratings of different traits. This error can be minimized by rating one trait at a time for everybody. In the graphic scale the items can be staggered so that a favorable indication is sometimes at the right and sometimes at the left. Objective traits which yield some observable product have the highest reliability. Length of acquaintance with the person rated should be adequate to form a judgment but if it is too great, the rater may become accustomed to unfavorable traits and underestimate them. Raters should receive special training before undertaking the job. Merit rating uses procedures like the foregoing for evaluating present employees with a view to transfer and promotion.

Academic record is a possible predictor of vocational proficiency. There are empirical indications that persons with good records achieve subsequent success—higher salary or being listed in *Who's Who.* School records in special subjects may have a bearing on vocational promise in jobs that require some familiarity with those subjects. However, academic grades are inferior to achievement tests in the same subjects administered at the time of employment.

Previous work experience should be considered with reference to vocational placement. If this is in a job identical with the proposed one, the connection is obvious. Substantial correlations are found between earlier and later success in a job, although there is a critical question as to how big an initial sample is necessary before it becomes a valid predictor of the later performance. If two jobs require similar aptitudes, success in one may be indicative of success in the other.

This evaluation of previous job experience may be implemented by means of job families. Such a family consists of a base job followed by groups or tables of jobs related to it. The first table includes jobs which are very closely related and subsequent tables list jobs that are less closely related. Job families may also be used to determine the best outlet for a person who is in a certain job and is seeking a change. A given table cannot be used in both directions but must be constructed specifically with reference to the direction in which it is to be used. The tables give no indication regarding degree of skill.

There are some possibilities of predicting vocational success on the basis of personal data such as are obtained in application blanks. For instance, salesmen as a whole are a little taller than their prospects, although within a group of salesmen, there is no clear-cut correlation between production and stature. Employees within a certain age range are more successful in specific types of work. Married employees generally are more effective. It is possible to take the items on an application blank, validate them statistically, and weight them in a regression equation.

It is common practice to secure recommendations regarding an applicant. The open type which the recommender gives to the applicant himself is worthless because the statements cannot be confidential. The recommender should communicate directly with the prospective employer. It is even better practice for the employer to send a blank or form to the recommender calling for exactly the type of information desired and arranged in such a way as to minimize the work on the part of the recommender.

An employment interview, as ordinarily conducted, has high unreliability. Some of this is due to the personal, unvalidated generalizations made by the individual interviewer. Much can be done to improve the interview by pooling the results of several interviewers, by obtaining good rapport at the outset, and by watching for factors that have already been demonstrated to be valid. Such factors may be listed on a form to which the interviewer refers as necessary. This procedure may be extended to comprise a rating scale for the interviewer to execute either during the interview or immediately afterward. The interview should do more than decide about hiring the applicant. It should give him information about the company and lay the basis for better morale if he is hired.

Job analysis is often conducted to yield all the necessary information for the employment man. The analyst, preferably with some training in observation and interviewing, follows a schedule, talks to workers, observes them, talks to supervisors, and organizes his notes ultimately into a systematic job analysis. A typical schedule includes a job summary, relation to other jobs, minimum qualifications with reference to age, sex, physical characteristics, previous experience; gives information about lines of promotion, supervision given and received, seasonal characteristics; and includes further details about duties, working conditions, equipment, and hazards. The psychological predictors described above may very well be incorporated into the job analysis schedule.

18

EFFICIENCY IN INDUSTRIAL WORK

Fundamental Principles of Learning

OUR NEXT CONSIDERATION is enabling the worker to realize most effectively the aptitudes on the basis of which he was hired. The industrial worker learning a new job is subject to the same basic principles of learning as the white rat in the laboratory or the child in school. These basic principles were discussed in Chapter 6 with the emphasis on learning in the school situation. They will not be repeated in much detail but their application to industrial situations will be noted. Much industrial learning is of the typical trial and error type. But the foreman, like the school teacher, can call attention to crucial points, give the individual a little extra practice on them, help eliminate incorrect responses, and provide motivation. Thus, the learning differs from outright trial and error because of supervisory guidance. This guidance is facilitated by the application of certain basic principles.

Repetition—law of use. The first basic principle noted in the earlier discussion is the so-called Law of Use. A workman who is turning a taper makes certain adjustments with his chisel and by repeatedly doing it in a certain way, develops the appropriate habit. In this repetition, however, it is important to stress accuracy in contrast with speed. In an investigation of learning to typewrite described earlier, a group which placed initial emphasis on accuracy ultimately was 17 per cent faster than the speed group and made about half as many errors. By the same token, a workman who throws the clutch too far or hits the rivet too vigorously with the hammer is going to fix the wrong responses and ultimately will have to unlearn them.

This desirability of initial stress on accuracy must be qualified for if it is carried too far, it may simply develop habits of deliberateness so that the workman never can acquire much speed. Then there are some simple operations where a high degree of accuracy is not necessary or where if a bit of material is dropped, it is cheaper to let it go than to stop and recover it. There are experimental indications that too much initial stress on accuracy in very simple acts reduces ultimate speed, whereas the early stress on accuracy is more important for more complex work. There is also the fact that a rapid ballistic movement is different from a slow one for some operations as it involves only one of an antagonistic pair of muscles. In throwing a ball, for example, the flexor muscle at the shoulder is operative and the extensor muscle is relaxed. If one attempts to throw a ball in slow motion, both extensor and flexor muscles are operating simultaneously. The muscular patterns for slow and fast are distinctly different and practice on one would not help the other very much. If an industrial operation involves ballistic movement, it may be advisable to emphasize the form of the movement, even at some sacrifice of accuracy. In general, then, it is well to start with some initial emphasis on accuracy, but as soon as possible, the worker should become concerned about speed. As Viteles puts it, "Habits of quick workmanship should be on the heels of those of accurate workmanship." Stress on accuracy at the very outset, when abortive habits of doing the thing in the wrong way might be formed, can be followed by a gradual speeding up before any habits of deliberateness are developed.

Disuse. A second principle is that an incorrect response gradually drops out through disuse if it is not repeated very much. If a workman holds a chisel awkwardly, has the fact pointed out to him, and seldom does it thereafter, he soon loses the incorrect habit. If he attempts to put a #12 machine screw into a #10 hole he will not continue to do so if he is corrected a couple of times. The instructor should be alert to these incorrect responses that may be eliminated through disuse.

The law of effect (page 22) deals with the fact that learning is facilitated if the correct response leads to satisfaction and the incorrect response to dissatisfaction. The industrial learner who is commended for good work or reproved for poor performance learns more rapidly than if nothing happens. If he fails to attach the heel evenly, or overlaps the wires when winding a magnet, or stacks the plies when building the tire, the foreman takes cognizance of it. Conversely, a bit of encouragement will facilitate his progress: "That's fine," or "You are learning rapidly."

The comparative merit of reward and punishment is a moot problem. It is, of course, difficult to quantify the amount of reward or punishment experimentally. Experiments with children suggest a superiority for eward. The problem is complicated however by differences between individual learners. There are experimental indications that the effectiveness of reward or punishment may depend on introversion or extroversion. A group of fifth-grade children took certain cancellation tests, were praised or blamed after the first attempt, and then repeated the test. It developed that praise caused a greater increase in output for introverts than for extroverts, and it was better than blame for the introverts. On the other hand, blame increased the output of the extroverts more than that of the introverts and, moreover, was better than praise for the extroverts.[1] Evidently the extroverts can take it. The point needs further study, particularly with adult samples.

The comparative merit of praise and blame depends also on the person who is administering them. High-school and college students took certain code substitution tests. Two different testers conducted the experiment with praise and blame techniques similar to the foregoing. It developed that praise was more satisfactory than blame with one of the testers, whereas with the other it was worse.[2] It was not possible to discover the reason for this result; it probably reflects something in the personalities of the individuals. A similar variable might operate in an industrial situation.

A point that should be stressed again deals with the actual setting in which the effect is administered. Rewards are all right on a public occasion, in fact, the effect is somewhat enhanced. Reprimands, on the other hand, should be administered in private. A foreman who made it a practice to have other workers present when he was reprimanding an employee was resented not merely by the worker himself but also by his fellow-workers.

In the usual industrial situation there is apt to be more emphasis on the negative rather than the positive aspects of this law of effect. The average supervisor or foreman is sure to say something when the learner makes mistakes. If he does this exclusively, it may lead the employee to cover up his mistakes, to dislike the boss, and even to get discouraged and practically give up. The positive aspect—a little commendation for good performance—is not so apt to occur. This is unfortunate. The positive aspect of the law of effect builds morale as well as promoting learning. The worker comes to like the man who commends him and even finds the work itself more enjoyable. From the above discussion it is obvious that praise is not inferior to reprimand as a factor in facilitating learning and it does have this additional contribution to morale. Thus, it is well for the industrial instructor to bear in mind that a good word now and then may be advantageous.

---

[1] Thompson, G. C. and Hunnicutt, C. W., "The Effect of Repeated Praise or Blame on the Work Achievement of Introverts and Extroverts," *Journal of Educational Psychology,* 1944, 35, 257–266.

[2] Schmidt, H. O., "The Effect of Praise and Blame as Incentive to Learning," *Psych logical Monographs,* 1941, 53, No. 3, 56.

Conditioned response. Although most industrial learning is of a modified trial and error type, there are occasions when conditioned responses are involved—for example, when the worker must learn to react at a certain moment to some particular stimulus which he receives from the mechanism with which he is working. If it is necessary for him to throw a clutch when he sees the gears rotating at a certain speed, the instructor may stand beside him and say "Now," at the proper moment. The worker reacts at first to the verbal (unconditioned) stimulus. He is also stimulated by the gears revolving at a certain speed and presently responds to that particular speed without the verbal stimulus. The speed of the gears has now become the conditioned stimulus.

Incentive. Another important feature in learning is incentive. The school child who is apathetic and has no interest in his work makes slow progress. Similarly, in industrial learning, a worker who does not like his job or his boss, whose pay does not depend on how much he does, and who has no ulterior recognition for good accomplishment simply does not learn as readily as a worker in the converse situation. Incentive functions, too, in a larger setting than mere instruction of the new employee. All through industry the over-all effectiveness of the operatives depends on their attitudes and incentives. It will now be profitable to consider incentive in a wider setting, although the initial interest is from the standpoint of the new worker learning a job.

Wages constitute the most obvious industrial incentive. Remuneration is the basic reason why most people work. An obvious principle in this connection is that a worker is apt to do more if he is paid according to how much he does. In general, persons who are on piecework are better motivated than those who are paid so much per unit time, because in the latter case additional effort does not yield any greater financial return. Even if one is not actually on piecework, the prospect of reaching that stage may serve as an incentive for the beginner. Many organizations provide some kind of a bonus in the wage structure. There are numerous schemes of this sort, but the basic notion is that if a person reaches a certain level of production in a given time, the rate is increased somewhat—he is paid proportionately more for what he does beyond a certain amount. It is a very delicate problem to set the level for such a bonus correctly, and, for that matter, setting the ordinary piece rates is a critical problem. If a rate is set too high so that the cost of production is excessive, there is no profit; on the other hand, if the rate is too low, the workers do not receive adequate compensation for what they do, and their standard of living may be lowered to the detriment of their morale. That is why workers are so leery about the time-study man who is attempting to find what a job is really worth by noting how long each operation takes. It is common practice to slow down a little when the time study is made so as to be sure that the piece rate is not set too low. The level of the bonus set is critical, too. An unattainable bonus defeats its own end. After an employee attempts to reach it in vain a few times, he gives up and, furthermore, is disgruntled about it. The effect of three different wage systems is shown in Figure 14, which deals with ten British girls manufacturing confectionary.[3] The general results appear in the lower section of the figure. For the first nine weeks they were on a straight time rate of so much per day. Then, for sixteen weeks, they had a special bonus system as follows: the girl with the lowest

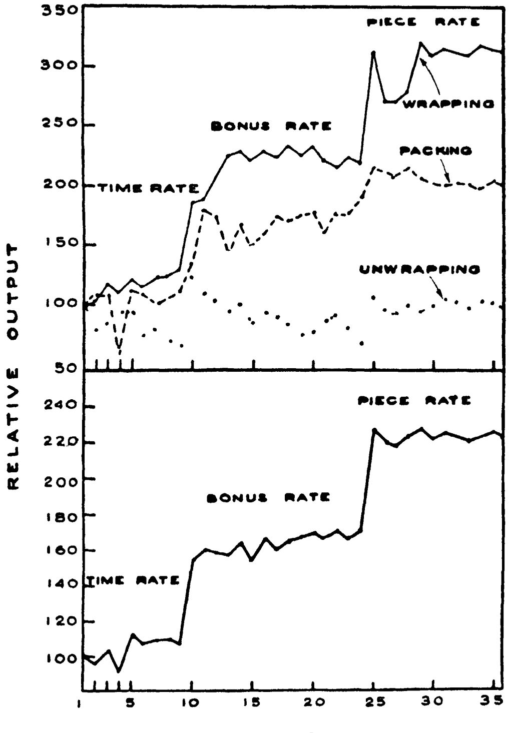


Figure 14. Effect of Different Wage Payment Systems.

---

[3] Wyatt, S., *Incentive in Repetitive Work*. Industrial Health Research Board Report, 1934, No. 69.

production in one week received the same pay in the following week, but the next superior girl was paid a little more, and the next best one a little more still, that is, the bonus depended on one's relative standing in the group. Finally, for the last ten weeks they worked on a straight piece rate. The ordinate of the curves represents the relative production, taking the initial production as 100 per cent. The increases due to bonus and piece rates are obvious. The piece rate more than doubled production. An incidental result was that there were fewer disturbances among the workers as the incentive increased. With the time rate there were about 20 per hour, with the bonus, 17, and with the piece rate, 11. Another interesting aspect appeared when the same girls performed three different types of work under the three payment system (see upper section of Figure 14). One job involved wrapping candy, another packing it, and the third unwrapping items which were defective. The unwrapping operation was not affected favorably by the different pay incentives. Undoing defects was meaningless to the girls. It is significant that the effect of the pay incentive depended somewhat upon the kind of work involved.

Wages are not the whole story in industrial motivation. Social factors may actually defeat a wage incentive system. Sometimes the workers have an idea of what is a suitable day's work and simply limit production to that level. Such a policy may be detected in production figures. If the numbers of units done per day by different individuals are somethink like 999, 1002, 1001, 998, it is obvious that they were trying to hit 1000 and miscounted slightly. An employee may be told that something "will happen" if he does not conform to the informal limit set by the group. In one organization anyone could "bing" a man who went beyond this limit, that is, hit him on the muscle of the upper arm with the edge of the hand. Sometimes the rate of production is limited by deliberate action on the part of the employees, for example, jamming a conveyor belt. There appears to be a balance between the money received and the worth-whileness of the job from the standpoint of effort. Thus, it is a mistake to rely on the wage incentive as the only effective motivation for the new learner or for the old-time employee.

There are some other complications regarding financial incentives such as whether the employee actually gets the reward himself. There was a case of some young girls in a British industry threading needles for the skilled workers. Their best production was 96 dozen a day. Various bonus schemes failed to increase production. Finally, they were told that when they completed 100 dozen they could go home. There was a general exodus at about 2:30 in the afternoon. Further analysis indicated that these workers, being minors, took their pay envelopes home unopened, so that if they exceeded a certain amount their parents received a bonus. There was no motivation for the youngster herself. Other devices were then tried which gave them some personal incentive—for example, getting Saturday off if they achieved a certain amount during the week—and ultimately they achieved 300 dozen a day.[4] There are many families where an adult takes home the pay envelope to be opened by another member of the family.

For incentives other than financial the initial reception of the employee may go a long way toward setting up a favorable attitude. This point will be discussed later in more detail in connection with morale. The employment office should provide a congenial waiting room and an opportunity to talk with someone across a desk, rather than through a window. The applicant should be told about the opportunities in the concern but also about unfavorable features of the job such as hazards and inconveniences. He should be introduced to the supervisor and to some fellow workers and, in general, made to feel at home.

The foreman's attitude toward the new man or even toward the older employees may contribute to incentive. He should work *with* them rather than *over* them. His tact in handling delicate situations—grievances or correcting faults—is important. His enthusiasm for the work may be contagious. A sympathetic attitude toward the beginner and an apparent interest in his progress is helpful.

Working conditions contribute to motivation if they are congenial and comfortable. Cleanliness, sanitary facilities, conveniences, and adequate lighting may lead the employee to like the job and therefore exert greater effort.

Another incentive is prestige. After all, a person likes to rate and appreciates any little recognition that can be given for good performance. This is related to the matter of praise and blame. If the commendation involves some public recognition or if, at least, a worker's accomplishment is known to some of his fellow-learners, so much the better.

Knowledge of one's progress is often an incentive. The school pupil likes to know how he is getting along, and the same thing is true, perhaps to a lesser degree, for the industrial worker. A group of employees who were operating Hollerith punch-card machines practically doubled their production largely because of knowledge of the results.[5] When the worker cannot be aware of progress, it may be advisable to install special devices to make awareness possible. In a Pittsburgh utility the stokers had no indication of how well they were doing. Some gauges were installed to show the efficiency of the individual boilers, and the data taken from those gauges were plotted to show individual improvement in the technique of firing the boilers. The result was an annual saving of $333,000 on coal. This could be attributed largely to the increased incentive for the stokers because of their knowledge of just how they were getting along.[6]

---

[4] Lee, C. A., "Some Notes on Incentive in Industry," *Journal of the National Institute of Industrial Psychology*, 1932, 6, 180–183.

[5] Bolt, R., "Das Prüfen in Anlernen von Hollerith Locherinnen," *Psychotechnische Zeichshrift*, 1931, 6, 19–36.

The incentive value of this getting ahead is brought out in studies where employees are asked to indicate their preferences for certain types of incentives. One investigation used a paired-comparison technique with questions like the following: "Would you rather receive more pay and have an insecure job or receive less pay and have a secure job?" By this general technique the five incentives indicated in Table 28 were compared. Each one obviously had four chances to be chosen by a given subject. The data for all the subjects who participated were averaged and reduced to a per cent of the maximum possible score. The table shows that opportunity for advancement ranks the highest for both men and women, with security coming next and salary in third place.[7]

TABLE 28

Choice of Incentives; Per Cent of Possible Maximum

	Men	*Women*
Salary	46	39
Security	69	72
Good Supervision	33	45
Hours of Work	15	21
Advancement	87	76

The role of competition as an incentive was mentioned in connection with school work. It goes back to a basic instinctive tendency which probably brought us through the Stone Age. In industry it may take the form of rivalry between different individuals striving for a record or a prize, or it may develop between different groups of workers. In a freight warehouse different squads competed with one another in loading materials. In automobile manufacture rivalry sometimes arises between different shifts, each one leaving in large chalk marks on the floor the number of units which they just assembled. Competition among beginners learning a new job may provide incentive, particularly if a little prestige goes to the winner. Some studies (page 120) indicated that competing against other individuals is more effective than being a member of a group competing with another group. Occasionally, a person finds it challenging to compete with himself, for example, to surpass the bogey. There are also possibilities in social facilitation. People derive some stimulation from their fellow-workers who are engaged in a similar activity. People even do a little better in taking coordination tests in the laboratory when a small audience is watching the performance.

---

[6] Bingham, W. V., "The Science of Work," *Technology Review*, 1932, pages 371 ff.

[7] Blum, M. and Russ, J. J., "A Study of Employee Attitudes Toward Various Incentives," *Personnel*, 1942, 19, No. 1, 1–8.

Another general consideration is the immediacy of the goal. A group of sewing machine operators was told after one week's training that their output was 20 to 25 per cent of the minimum skill level required and that they should reach that level in about three months. This was a remote goal. They improved slowly with frequent plateaux in their learning curve and in fourteen weeks had attained only 60 per cent of the standard. Another group was given the same initial instructions to the effect that they were doing about 20 to 25 per cent of the minimum, but they were given a definite goal for every week. This group reached the standard in fourteen weeks.[8] Obviously, the more immediate goals provided greater incentive. Another investigation, which pointed in this same direction, brought out the further fact that giving the individual a large batch of work at once was not as effective as providing smaller amounts. The subjects were presented with 500 arithmetic problems which they were to do, or with 2,000, or with 4,000. A record was kept of production for each minute, and the data for the first few minutes are given in Table 29. It is to be noted that, in every column, the performance decreases consistently down the column; in other words, with a larger assignment confronting the subjects, they did less.[9]

TABLE 29

Rate of Solving Arithmetic Problems as Related to the Amount of Work Ahead *

Number of Problems	*First Minute*	*Second Minute*	*Third Minute*	*Fourth Minute*	*Fifth Minute*
500	82	79	79	78	78
2000	78	75	74	74	73
4000	75	72	71	71	71

* Krueger

---

[8] Lewin, K., "Time Perspective and Morale." In *Civilian Morale*, G. Watson editor, New York, 1942, pages 48 ff.

[9] Krueger, W. C. F., "The Influence of Amount Limit and Time Limit upon Rate of Work," *Journal of Applied Psychology*, 1937, 21, 113–118.

Partial activity. Learning may be facilitated by confining efforts to the crucial part of the situation. An industrial learner may come to direct his attention primarily to the needles or the chisel and neglect the rest of the visual field such as the gears or the belt at the end of the machine. If he is lifting his hands unnecessarily high, he can develop a tendency to keep them down and devote himself to the actual business of manipulating the machine rather than making flourishes in the air. Although the worker will hit upon much of this by trial and error, an instructor can be a big help in calling attention to the unnecessary things and directing effort to the crucial part. It may even be possible to conduct research on what are the really crucial parts. For example, a study was made of the process of taking a screwdriver from the holder and putting machine screws in a piece of metal until they were flush with the surface. All the motions made were recorded electrically on a moving tape, which was analyzed in order to note the parts in which the greatest practice effect appeared. It developed that the crucial items were getting each hand into position, moving the right hand while it held the screwdriver, and moving it back again. In subsequent instruction it was possible to utilize partial activity and have the learner concentrate especially on these points.[10]

Transfer of training comes up again in the present connection. The conclusion of the earlier discussion (page 146) was that transfer occurs primarily in so far as the two functions in question have identical elements. A certain amount of transfer might be anticipated from operating a wood-turning lathe to a metal-working lathe, because both jobs involve holding or adjusting a chisel against a rotating piece of stock. Operations of different types of calculating machines have much in common.

A few studies of transfer under industrial conditions corroborate the foregoing principles. One hundred girls assembled six looms, then spent forty-five minutes a day for five days assembling safety switches and then did twelve more looms. A control group did the initial six looms and then, after a corresponding length of time, did twelve more. There was no difference between the experimental and the control group in the initial loom record but a possibly significant difference between the two groups on the last looms, especially on the very last six. The transfer effect was attributed to a high similarity in the motions made in assembly.[11] On the other hand, a group of workers put links similar to those used in bicycle chains on and off pegs on a turn-table and had intermediate practice in inserting small pegs into holes. There was no transfer, presumably because there was little identity in the two operations.[12] Transfer may be fully as much a problem of selecting as of training employees. From the former standpoint, the job families discussed in the preceding chapter take account of the identical elements, at least indirectly.

---

[10] Barnes, R. M. and Amrine, H. T., "The Effect of Practice on Various Elements in Screwdriver Work," *Journal of Applied Psychology,* 1942, 26, 197–209.

[11] Woodward, P., "An Experimental Study of Transfer of Training in Motor Learning," *Journal of Applied Psychology,* 1943, 27, 12–32.

Refresher training. It may be advantageous to give "refresher" work to some of the older employees in order to keep them up to date and abreast of technological changes. Otherwise the older, experienced employees actually may be inferior to the neophytes who have received their training in the recent techniques. This refresher program may include also some training in related jobs looking toward a more flexible personnel. In a public utility the meter readers were trained also in bill collecting so that they might shift over to that type of work in an emergency; ground men were given training in line construction and in splicing and transformer installation.

The Course of Practice—Learning Curves

Trend in industrial learning. The course of industrial learning, like that of school learning, may be expressed graphically and shows a similar trend (*cf.* Figure 5, page 137). There is the rapid initial rise due to acquiring a few associations or coordinations; the daily fluctuations resulting from changes in incentive, or effort, or physiological conditions; and then the final leveling off. Occasionally, industrial learning curves show plateaux similar to those found in some other functions. There are indications that they are more apt to occur if a task is complex and especially if it involves two different levels of complexity. Not a great deal of study has been made of industrial learning curves with reference to plateaux. However, when using such curves one should be on the alert for plateaux and note if they occur at almost the same level for all workers. If this is the case, the teacher can pay particular attention to the learner who is approaching this crucial stage, provide additional incentives and encouragement at that point, and perhaps bring him over the plateau. This general procedure was discussed in Chapter 6.

Equation of learning curve. It will be a good idea to recur at this point to the earlier discussion of the possible derivation of an equation for the learning curve. This has intriguing possibilities for industry as for schools. It would be feasible, on the basis of a little initial performance by an individual, to write the equation for his curve and extrapolate. This would help decide if he was properly placed and would indicate the instructional problem ahead.

---

[12] Henshaw, E. M., Holman, P., and Langdon, J. N., "Transfer of Training in Manual Dexterity and Visual Discrimination," *Industrial Health Research Board Report No. 67,* 1933, 1–21.

Use of curves. Comparatively little use has been made of industrial learning curves to date but they do have those two possibilities. They enable the instructor to keep better informed on the trend of the learner's progress. It is easier to look at a curve and note its slope than it is to interpret a series of numbers. They also contribute to motivation. It is quite effective for some learners to watch their own learning curves, follow the ups and downs, and attempt to keep the curve going up.

Special Training Devices

Moving pictures. Some special devices may be useful in industrial instruction. One of these is the moving picture. Difficulties are encountered when a beginner is being shown how to do a job. If the demonstrator does it in his natural fashion, the sequence is apt to be too fast for the beginner to observe in detail. If the demonstrator slows down, he actually changes the motions which he makes. The normal motion may be the ballistic type and the slow motion may utilize both extensor and flexor muscles—a quite different muscle pattern. Then the learner attempts to imitate the wrong thing. A good solution for this difficulty is the slow moving picture in which the film is run more rapidly when the shot is being taken and then at its normal speed during projection. This catches the motion as it really is but slows it down in presentation so that the beginner can observe it in detail and imitate it. If these moving pictures embody the third dimension stereoscopically, they afford a good demonstration.

Selecting the crucial part. Some other training devices are related to the principle of partial activity discussed above. If some part of the operation gives difficulty, a training device may be used to give additional practice on that particular part. In learning a textile operation beginners were handicapped by the emotional disturbance due to the unpredictability of threads breaking. The job consisted primarily of watching for these occasional breaks and fixing them immediately. A special device was arranged to adapt the learners to this uncertainty. A miniature loom had a rotating arm that periodically broke threads. The learner operated this device for a time, and presently became so accustomed to the breaking of the threads that this contingency lost its emotional flavor. Then, when he went back to the regular looms the uncertainty about breaking threads was no longer an emotional handicap.

Detailed knowledge of progress. Another series of special devices aim to show the worker just how he is progressing in some detailed aspects of the work. This does not mean mere over-all production, but rather how well he is accomplishing some finer detail of the work itself. To facilitate teaching the worker to reach through between threads and manipulate something behind without touching the threads, the training device had a series of threads and, in a rack behind them, small cylinders which were to be picked up and brought out between the threads. It was arranged so that touching a thread made an electric contact and sounded a bell. Thus, the learner knew when he made even a slight error. Quite similar was a device for teaching hairdressers to comb hair without pulling too much on the head of the client. The wisp of hair on which they were practicing was attached to a spring in such a way that anything more than a critical pull closed an electrical circuit and sounded a buzzer. In this way the pupil learned to discriminate kinesthetically how much pressure could be exerted with impunity. Another arrangement was used in teaching workers to file on metal. A piece of metal was clamped in an apparatus in such a way that it could move up and down against spring tension and could rock backward and forward as the file was held horizontally or tipped. Appropriate recording levers indicated on a moving tape the actual amount of pressure exerted vertically, the deviation of the file from a horizontal position, and the length of the stroke. The learner could consult the moving tape to see just what he had done, and detect errors which could not be observed subjectively.

Short-exposure apparatus. The possibility was noted in connection with reading of using a tachistoscope or short-exposure device to increase the range of perception. Presenting numbers of increasing length that must be read in a fraction of a second or maintaining the same length and gradually cutting down the exposure, extended the range of perception considerably and increased the speed of reading ordinary material. These techniques, thus far, have been used to a limited extent in industrial situations, but the possibilities are fairly obvious. A wider range of attention would help a foreman, for example, who might have to watch several looms, or it might be of value to inspectors who look at a panel assembly to see if all the items are there. This technique was valuable in training military personnel to recognize quickly enemy aircraft or surface ships and is now being extended to similar industrial problems.

The vestibule school may be classed as a special training device. It includes duplicates of the actual machines, and the beginners work on those machines in somewhat of a schoolroom atmosphere. Usually, a considerable number of jobs are taught in the same school. This makes for better instruction, because a special person who is familiar with methods of teaching and with the learning process is in charge. Standardized methods rather than those developed by some individual foreman are taught. Moreover, the emphasis is on learning rather than upon production. When instruction is given in the department under a foreman he is under the usual pressure and makes every effort to get the beginners producing as quickly as possible. In this effort he is inclined to cut corners. If some minor aspect of the operation ought to receive more repetition, although the worker might possibly get by without it, the foreman is inclined to eliminate that additional practice which a good teacher would include because he realized its ultimate importance. Another good feature of the vestibule school is that it breaks beginners in gradually. A youngster thrust from high school into an industrial atmosphere is somewhat at a loss; his older co-workers have a different point of view and even a different language. In the vestibule school he makes the transition with other beginners like himself. Again, if a mistake was made in the initial assignment of the person to a particular type of work, this may be discovered in the vestibule school and a tryout at some other operation is feasible there.

The usual vestibule school involves direct teaching of specific industrial jobs. There are cases, however, in which the program is broken up systematically into smaller units. In a large machine organization the school devotes periods to shop mathematics, blueprints, nomenclature, and basic shop problems such as using scales or micrometers. After this preliminary work the pupils are tried out on three machines, and the instructor can note on which of the machines the individual seems to be doing best so that he can concentrate on that machine thereafter. It sometimes is valuable to put some of the present employees in vestibule school in slack time and either train them in improved methods or in somewhat related jobs. When work was a little slack for some stenographers, they were sent to vestibule school to learn calculating machine operation. Subsequently, if there was a rush on calculating, these stenographers could be utilized.

Training Apprentices

Adjustment to individual differences. The discussion of industrial learning may conclude with a consideration of a number of special groups whose training involves some unique aspects. In apprentice training it is profitable to devote more attention to individual differences. The traditional procedure is to put an apprentice under a foreman for a certain number of years, after which he automatically becomes a journeyman. This procedure flies in the face of science. Unless the apprentices are extremely homogeneous with reference to aptitude some of them could become efficient journeymen in less than the requisite number of years, and others would require more. The obvious answer is to let them progress at different rates just as is done in school or college. Each apprentice should move through the different parts of his training program as rapidly as his proficiency warrants, and his transition from apprentice to journeyman should be based on demonstrated proficiency rather than the calendar.

Special techniques in training. The foregoing principle may be implemented by a systematic course of instruction with periodic checks on progress. Such a program in a machine shop arranged the work in divisions such as lathe, drill press, bench work, milling machine, and provided a manual for each of these divisions. If an apprentice started on the drill press and worked on the projects assigned, following his manual, when he reached the stage where he thought he had mastered the drill press, he said so, and was given a standardized proficiency test. If his performance in the test was unsatisfactory, he was given supplementary work on drill press and later took another test. If, however, he demonstrated his competence, then he moved on to the lathe division and subsequently took a test on that division. Thus, an apprentice with good aptitude for this type of work progressed rapidly and avoided a lot of wasted time.

Training Foremen

General importance. Training of foremen is especially important in situations where foremen are not selected carefully on the basis of their qualifications for the job. Frequently, the main considerations are seniority and experience, overlooking facility as a teacher and ability to handle people. All too frequently a foreman is handicapped in his relationships with workers by his own personal maladjustment. Case studies often reveal that the man was repressed in his childhood by a domineering parent or by older brothers or sisters, and gets his outlet by riding the men under him. Or perhaps he is aware of some personal inferiority but achieves an obnoxious superiority by virtue of his official position.

Content of program. Typical foreman-training programs include much beside the psychological aspect hinted at above. One typical course involved five divisions: Principles of Organization, Handling Men and

Employee Relationships, Cost Control, Quality Control, Scheduling. Another included Accident Prevention, Wage Adjustment, Training New Men, Retraining Old Men, Cost of Maintenance and Materials, Incentive and Cooperation. Obviously, in both these programs, there were psychological elements. It is this aspect which is of most concern in the present discussion. Much of the technical information about the work and its organization would be picked up by the man while he was still in the ranks, although the refresher course would be pertinent. But with reference to human relationships he would have more difficulty in picking up information by trial and error, therefore, it is desirable to have some specific instruction along these lines. A foreman's training program at Westinghouse placed considerable stress on personal relations and encouraged some self-analysis. The foreman rated his own skills, planning ability, leadership, and various other characteristics on a special form. This directed his attention to certain aspects of human relations. A psychological course for foremen organized as part of the Engineering Science Management War Training Program included the following topics: Morale, Its Importance and Measurement, Receiving the New Employee, Working Conditions, Leadership, Handling Delicate Situations, Discipline, Problems of Women Employees, Emotional Problems, Social Problems Arising from Fellow Workers, Outside Factors Influencing Attitudes or Emotions, Mental Maladjustment, Psychological Techniques in Placement, Fundamental Principles in Training, Methods of Checking on Progress by Tests and Ratings, Fatigue and Monotony, Accidents, Personal Efficiency. Much of the content of such a course may well center around the material in connection with morale in Chapter 21.

Instructional methods. The procedures desirable in training foremen differ from those followed in school or college. Many of the men are middle-aged, have been out of school many years, and are not accustomed to the academic situation. A lecture puts them to sleep. It is much better to require active participation on their part in some kind of conference or group discussion. It is well to prepare in advance some mimeographed material indicating the topics to be discussed, including perhaps some challenging questions which they may consider prior to the meeting. Material of a case study nature goes very well in this connection. It may pose some problems which might arise in a supervisory situation. If several foremen are asked to indicate how they would handle the problem, this leads to group discussion. The principle point is to keep interesting material and something that will promote their active participation in the discussion before the group.

Training Salesmen

Institutional salesmanship. The old-style drummer is passing. He could sell anything, using the same tactics in every case with a breezy manner, a stock of stories, glib conversation, dramatic flourishes, cheap cigars, and slaps on the back. He operated by sheer force of personality. The trend now is toward a more institutional type of salesmanship in which the salesman represents an institution and interprets its policies to the buyers. This calls for a somewhat different type of individual and also for a different type of training.

Job analysis. If sales training is to be approached systematically, it is important to determine just what the salesman actually does. A good procedure is to send a job analyst around with the salesman. He will presumably note such things as the kind of questions which the prospect asks, the problems which he raises, the amount of technical information the salesman needs, to what extent he has to demonstrate the product or use charts and diagrams and other aids. The same procedure can be followed in the retail field by an analyst who lingers in the vicinity of the counter. Questions asked by the buyers will be especially significant —the texture of the fabric, why this lawnmower costs more than the other although they are the same size, the relative merits of different dyes. Such analysis will suggest some of the content of the sales-training program. Several items that are used widely in such programs will be mentioned.

Study of prospect. Sales trainees should be taught, in the first place, that it is desirable to study the prospect before actually contacting him. It is necessary to determine whether he might actually be in the market at all, in terms of both needs and assets. A fundamental feature in advertising and selling is to ascertain in what the prospects are interested and what they want and then, if possible, to modify the product in the light of these wants so as to minimize sales resistance. It is also a good idea, if possible, to obtain information about the prospect's avocational interests. This information may be useful in securing good rapport, particularly in the initial approach. Finally, there are pertinent considerations about the prospect's personality. If he is always gruff and apparently hostile, it will help the salesman to know that fact in advance so that he will not be too disturbed by the initial rebuff.

The product. A second consideration is for the salesman to become familiar with the product or line before attempting to sell it. It is embarrassing if he cannot answer all the questions which the prospect raises and still more so if something misfires in a demonstration. If he is demonstrating a calculating machine and it jams, it is necessary for him to back out of the interview as gracefully as possible, saying that he'll be back tomorrow with one that will work. The damage is done by that time. Some concerns recruit sales personnel from the manufacturing departments. They watch for workers with acceptable personalities and good intelligence and groom them for subsequent sales positions. If such a person has a machine jam in a demonstration, he can take a screwdriver from his pocket and have it running again in 30 seconds as though nothing had happened, whereas another man would lose the sale.

Sales policy. The salesman should be familiar with sales policies of the organization. These include such things as the nature of the contracts, advertising policy, how advertising is geared to local conditions, window display, and returned goods. These are matters that the salesman may have to explain or interpret to the client.

Actual selling job. A final aspect of sales training is the transition to the actual face-to-face selling situation. The conventional procedure is to send the new man out with an experienced salesman. The latter does all the work at the outset, but the beginner gradually takes over more and more of the interview. One precaution to be observed is that the salesman who is doing the training should be competent and up-to-date. Sometimes an older salesman who is slipping will be assigned to this function on the notion that it doesn't matter if it interferes with his own performance because he is not contributing very much anyway. This is unfortunate because he may be unable to teach the new man the most effective and up-to-date methods.

Special devices for training. Sales-training programs may be implemented by certain special features. One of these is moving pictures or transcriptions. The film or transcription demonstrates successful sales interviews and sometimes, by way of contrast, some poor methods. Such a film used by a manufacturer of dictating machines shows one salesman who gets in to the prospect by wisecracks, tries to overwhelm him by a breezy approach, and is thrown out, whereas another salesman works first on the secretary and induces the boss to dictate a short letter and then listen to himself as it is played back.

Another training device is the sales convention; at least, that is supposed to be one of its functions, although too frequently it degenerates into an inspirational meeting and a good time. Both of these aspects are transitory. One profitable use of the sales convention is to divide the members into small groups which meet successively with leaders of round tables. Each leader specializes on one aspect such as product, advertising, window display, service, records, competing lines. In this way the individual salesman participates in an intensive discussion on each topic with a small group of fellow-salesmen and a leader.

Check on sales training. When salesmen are undergoing instruction, it is desirable to get some record of their progress just as in any other learning situation. This may be handled in the retail field by service shopping. An experienced observer goes around incognito impersonating a customer, and notes the responses of the sales person. His observations are written up later, and any unfavorable points are discussed with the sales person as part of the training program. A similar procedure is followed in some organizations where the sales personnel operate on the telephone or at a window. An observer can plug into the telephone or a microphone concealed at the window and pick up both ends of the conversation. The employee knows that this is being done but does not know when. Thus it is possible to check on the progress of the employee, particularly in the early stages of learning. Such things may be noted as service failures—being too gruff or failing to apologize when leaving the phone temporarily. For salesmen on the road the procedure is more difficult. One concern handled it by sending a friendly letter to the customer to the effect that so-and-so would call in the near future, and that the concern was interested in his progress as a salesman. The recipient was requested to fill out the enclosed blank after the salesman's visit. This was an easily executed alternative-answer list including the following: Personality—pleasant, serious, breezy, Courtesy—well-mannered, too bold, Talking—too fast, too loud, Knowledge of Merchandise—well-informed, too technical, Selling Technique—answers objections all right, high pressure, arrogant or opinionated, rush through.[13]

Best Methods of Work

Underlying philosophy. A problem related to the training of the new employee is the actual operations in which he is trained. It is desirable to teach him the best way of doing the job so that he can accomplish more with the same amount of effort. This last point deserves emphasis because it touches on the underlying philosophy of industrial psychology. Efficiency experts sometimes attempt to induce workers to exert greater effort using the same ineffective method. Psychology is more concerned with getting a better method. This distinction may be clarified by an analogy. Suppose that centuries ago a valuable manuscript was to be copied and the only person available could print only capital letters. It would be possible to spur him to greater effort by some sort of bonus or reward contingent on the rate at which he printed. On the other hand, he might be taught to write. If the manuscript was of considerable length, writing would be better in the long run. The former approach is analogous to industrial speeding-up, and the latter to industrial psychology's attempt to find better ways to do the job with the same amount of effort.

---

[13] Crabb, C. G., "Appraising Salesmen," *Printer's Ink*, 1933, 164, 1 ff.

Motion study is a technique that is widely used in the effort to determine the best way of doing a job. This field is on the borderline between psychology and engineering. The classical work was done by Gilbreth, who was an engineer, but his wife, who collaborated with him, was a psychologist. The technique will be discussed briefly at this point, regardless of just where it is allocated. Psychologists, at least, should be familiar enough with it to appreciate its significance. The objective is to eliminate unnecessary motions. It is not possible always to detect these by merely watching the worker, but it is necessary to secure some type of record which can be analyzed when it is cold. Conventional procedure employs photographic techniques. In the earlier days this was done by attaching a small battery lamp to the member being studied, for example, the hand. A time exposure was taken during a single cycle of the motion, and the lamp traced a continuous line on the film although the picture of the worker was blurred. The time was recorded by having the circuit through the lamp interrupted a constant number of times per second. More recently moving pictures have been used, and a fast clock is photographed along with the subject. If stereoscopic pictures are used to give the third dimension, the result is a detailed record of the operation, which can be studied at leisure. The motion can then be broken down into small units often called "therbligs" (Gilbreth backwards), and points are determined where some unnecessary motion may be eliminated. Some such possibilities are obvious from these photographs. For example, a man is drilling pieces of metal on a drill press and dropping them into a box on the floor at his side, and the photograph reveals that he bends over and watches every piece to see if it reaches the floor. At other times, it may be necessary to make a minute analysis of the record.[14]

Various laws of motion study have been set forth. The following are typical: Both hands should begin the motion simultaneously; both hands should complete motions at the same time if possible; both hands should not be idle simultaneously; motions of arms should be in opposite and symmetrical directions and simultaneous; motions should be within the limits of the normal work place, that is, without excessive reaching; smaller muscle groups should be used in preference to larger; feet should be used to relieve motions of the hands if possible; motions should be rhythmical if possible. There are numerous empirical indications of the effectiveness of these procedures. The classical study dealt with bricklaying. Previously the worker picked up the brick with the left hand, turned it around until the best face was toward the surface of the wall, reached for the mortar with the right hand, spread the mortar, and put the brick in place. This procedure was shortened by having the workers reach for brick and mortar simultaneously, by letting an unskilled worker arrange the bricks in a packet with the best face of each in the same direction, by supplying the bricks at waist height, and teaching the men not to pick up any mortar which they dropped. The initial eighteen motions were reduced to about five, and instead of laying 120 bricks per hour, the men laid 350. This is typical of some of the earlier results of motion study. A group of girls folding cloth were making from twenty to thirty motions. It was possible to reduce these to ten so that instead of 150 dozen, the average girl did 400 dozen per day. For ironing shirts in a laundry the dampening time was reduced from 13 to 11 seconds by using one movement instead of three, folding from 21 to 13 seconds, with similar reductions in reaching for the shirt, setting the collar, reaching for and moving the iron to and from the work, an over-all saving of 34 per cent.[15] Experiments even indicate that the effectiveness of the motion depends on the size of the object involved; in picking up washers if the washer is less than an eighth of an inch in thickness, it is better to place both fingers on the flat surfaces rather than attempt to grasp the edges. It is possible to pick thicker washers up by the edges.[16] Motion study has been applied to agricultural operations. For instance, it is better to pick tomatoes with both hands close together, either bending the knees slightly or squatting; to pick a tomato in each hand, slide it to the palm, and pick up a second one with the fingers before moving the hands to the basket.

---

[14] For a reference to the early work see Gilbreth, F. B., *Applied Motion Study*. New York: Macmillan, 1919; for a general reference and review of recent literature see Zerga, J. E., "Motion and Time Study: A Resumé and Bibliography," *Journal of Applied Psychology*, 1944, 28, 477–500; also Knowles, A. S. and Thomson, R. D., *Management of Man Power*, Chapter IV. New York: Macmillan, 1943.

By way of an over-all indication of the effectiveness of motion study the following are the percentages of improvement attributable to it in a number of types of work:[17] putting paper covers on small boxes, 100 per

---

[15] Smith and Reinhard, "Motion Camera Uncovers 34 Per Cent Saving," *Factory Management and Maintenance*, November, 1936, 94, 46–47.

[16] Barnes, R. M., *Research in Motion and Time Study*, Seventh International Management Congress, Washington, 1938, pages 135–140.

[17] Viteles, M. S., *The Science of Work*, page 245. New York: Norton, 1934.

cent; drilling holes in metal, 300; bricklaying, 192; bleaching shirting, 80; putting up cloth, 150; tacking cloth, 170; making pillow-cases, 230; cotton-plant, 100; drill press in factory, 100; cotton cloth bolting, 220; unloading pig iron, 500; shoveling, 270; riveting, 69; sulphate pulp mill, 100; tobacco pouch factory, 100. These figures indicate that when no previous consideration has been given to the method of doing a job, a considerable improvement may be affected by motion study.

Some criticisms have been directed at the motion study procedure. Gilbreth made a good deal of the "one best way" to do a job. This tends to contradict some of the things that are known about individual differences. After all, with different musculature and different aptitudes, there may be cases where two people could not operate most effectively in exactly the same fashion. Some flexibility may be desirable. In fact, a motion study may be conducted with a given individual, and improvements may be made in his procedure which might not be helpful for everyone else doing that job. Another criticism is that breaking down the job into its elements may overlook the fact that total skill is actually more than the sum of the parts. There should be a free flow from one motion to the next rather than a series of discrete motions which are made one after another. Furthermore, a completely standardized motion may be less satisfying to the worker. Some people get a bit of pleasure from minor individual variations which they make. It is somewhat like the craftsman in an earlier era who made a product that was slightly different from others and injected a bit of his own personality into it. Obviously, not much of this can be done in modern manufacture, but occasionally a worker might derive a little variety from holding the tools differently or moving his hands in a different pattern. The answers to these objections are somewhat empirical, except for the possible effect on morale. If the new method works better than the old, the fact is incontrovertible, and it may be possible to improve attitudes in some other way.

Arrangement of Materials

Miscellaneous examples. Motion study, in addition to setting up new habits on the part of the worker, may indicate desirable changes in the arrangement of the materials used. For example, if a worker is to use a hammer in his right hand and a chisel in his left, it is obviously desirable to have the hammer in a rack at the right side of the bench and the chisel at the left so that he will not have to cross his hands in reaching for them. Most cases will be less obvious than this. It may be possible to minimize long reaches or excessive walking in sorting operations. A worker who is packing certain items which are stacked on three different tables must walk back and forth. If the three tables are arranged on the radius of a circle, the worker in the center can reach all of them by rotating without stepping. In packing cigarettes the boxes were placed in a pile rather than at random, the paper was in a convenient position, and the table was tilted a little. In six hours the workers did what had previously taken them seven and a half. Sometimes, instead of presenting the parts which are to be assembled all scrambled together, they are pre-arranged by an unskilled helper in an appropriate order. They may even be located in chutes which feed them to the work place by gravity. A special table was devised to facilitate placing letters in envelopes. The box in which the letters rested had a spring bottom so that the top letter was always at the top of the box. The table was fluted so that the fingers could be dropped into grooves in the table and get under the envelopes without relying on the finger-nails. The average girl did 1,848 enclosures per day as contrasted with the previous 1,480.[18] Some miscellaneous economies in office equipment included a notch in the corner of the carbon paper to facilitate slipping out the typed sheets; rubber stamps with one side of the handle flat so that they may be oriented without looking at them; pens and pencils that are pre-positioned in a holder; knobs for drawer pulls rather than the type of handle where one has to reach underneath. In an assembly operation a signal for the approach of a new unit was most effective when it preceded the actual arrival by about forty seconds. In an operation involving a lot of hammering, the best arrangement was shown empirically to be one in which the height of the bench was 54 per cent of the height of the worker.

A problem which receives occasional attention is the arrangement of the keys on the typewriter keyboard. There is general agreement on some principles. A minimum of words should be typed with a single hand because more rapid performance is possible when alternating the hands. For instance, with the word "the," while typing *t* with the left hand, the right hand can be getting ready for *h*, while that is being typed, the left hand can be getting set for *e*. This point is related to the accommodation of attention mentioned earlier. There are some words which cannot embody this alternation with the standard keyboard. The word "greater" for example is typed entirely with the left hand. Another consideration is the avoidance of difficult finger reaches. Still another is the matter of load on the different fingers. In general, the first and second fingers are more effective in coordination than the third and fourth, and most people are more adept with their right hands. The left portion of Table 30 shows what happens with the standard keyboard from the standpoint of load. This load was determined by analyzing an adequate sample of material like that which might be typed in ordinary practice. The proportion of d's in the sample constituted the load for the middle finger of the left hand—18 per cent in the table. Obviously, things are not as they should be for the right hand where the second finger carries only 7 per cent of the load and the third finger 13. Moreover, the left hand carries 57 per cent and the right 43 per cent. Then again, considering the three major rows, the middle or home row does only 32 per cent of the work although the hands normally are held oriented with reference to this middle row. It is logical for it to carry the heaviest load rather than for 52 per cent of the typing to involve reaching up to the top row.

---

[18] Rogers, H. E., "Motion Study Table for Clerical Workers," *Journal of Applied Psychology*, 1931, 15, 82–89.

TABLE 30

Load on Fingers: Per Cent of Letters Typed

	Standard Keyboard		*Dvorak Keyboard*	
	Left Hand	Right Hand	Left Hand	Right Hand
First Finger	23	22	14	19
Second Finger	18	7	13	15
Third Finger	8	13	9	13
Fourth Finger	8	1	8	9
Hand	57	43	44	56
Top Row	52		22	
Middle Row	32		70	
Bottom Row	10		8	

Various proposals have been made for revision of the keyboard to obviate the foregoing difficulties. One of these is the Dvorak keyboard. The arrangement of the symbols on the three main rows is as follows:

; ; : P Y F G C R L &/
A O E U I D H T N S ½-
⋮ Q J K X B M W V Z

The analysis of the load for this keyboard appears in the right portion of Table 30. The finger load is now more in conformity with the comparative effectiveness of the fingers, the right hand carries its appropriate share, and the home row takes over a major assignment. It is impossible to predict the ultimate keyboard. There are indications that school children learning to type with the Dvorak keyboard made much more rapid progress than those who used the standard arrangement.[19] A universal change of this sort naturally would be attended by an irritating period of transition because of conflict of habits. It is probable that the transition would be effected by having both types of machine available with beginners learning on the new type.

Special Equipment or Devices

Unnecessary decisions. Mention may be made of a number of special devices which have been developed in the interest of increasing efficiency and which have some psychological implication. This does not include the numerous engineering modifications of machinery and processes, but merely things that are of psychological interest. One of these is the elimination of unnecessary decisions. A worker sometimes consumes unnecessary energy and experiences undue emotion in the mere process of deciding what to do next. Everyone has experienced hectic days when things were crowding in upon him and he was pulled back and forth between alternatives. This may occur in assembly operations where the worker is given the parts scrambled together in a box, starts assembling, and then wonders what to do next—whether to go along the far edge of the base plate or come down the left edge. He makes many superfluous motions as well as getting disturbed emotionally. One device to forestall this difficulty involves a tray with compartments in which the parts to be used are arranged by an unskilled helper in an effective order according to a diagram or a rack in front of the bench on which the parts are hung similarly. The worker simply goes across the tray or rack, one row after another, picking off the parts in order and putting them where they belong. Such devices have reduced fatigue and promoted a more favorable attitude.

Emotional disturbance. An instance may be cited in which a special arrangement was developed to reduce emotional disturbance. A restaurant had an undue amount of breakage of dishes. Analysis revealed that much of this was traceable to annoyance and tension of those handling the dishes, particularly at the rush hours. The waiters frantically shouted orders back into the kitchen, and sometimes interspersed unpleasant comments in the effort to secure quick action. The kitchen personnel resented this and replied in kind, with resulting emotional disturbance. Emotion is a disorganized and inefficient condition, and as a result of the excess movements made in the course of it, the dishes suffered. When the difficulty was finally located, arrangements were made to eliminate this interplay of invectives. A system of push buttons and electrical signals was installed, so that instead of yelling for the eggs, the waiter merely pushed an impersonal button, and the cook saw an impersonal signal. Partitions were installed to minimize personal contacts. The breakage was reduced 53 per cent.[20]

---

[19] Anonymous, *Time* Magazine, March 20, 1939, page 39.

Methods of transporting loads. There are many situations in which workers have to carry loads by hand and this may be done by various methods. The problem as to the comparative effectiveness of these methods was investigated by measuring basal metabolism. The subject walked around a circular pathway in a large laboratory room wearing a mask with a valve arrangement so that he could inhale normally, but all his expired air was transmitted through a tube to recording apparatus in the center of the room. The tube ran along an overhanging pipe which was pivoted at the center of the room, and the subject simply trailed this as he walked around the circumference. The loads varied systematically from 20 to 60 pounds and were carried in different manners. By analyzing the expired air, it was possible to determine the number of calories consumed per unit of time. The loads were carried by the methods indicated in Figure 15. The horizontal axis represents the different loads in pounds, and the vertical axis the amount of oxygen used per kilogram-meter of work done. The higher the curve the more costly was the work

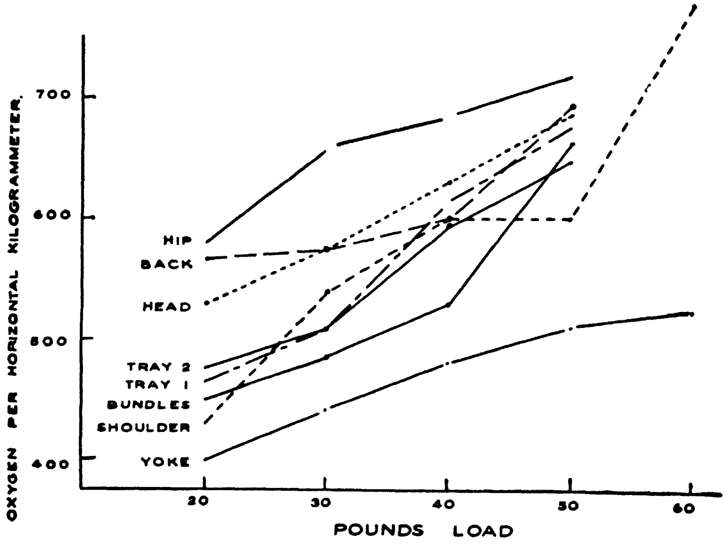


Figure 15. Method of Carrying Loads by Hand.

[20] Miles, G. H. and Eyre, A. D., "An Investigation Into Breakage Problems," *Journal of the National Institute of Industrial Psychology,* 1923, 2, 132–140, 150–154.

from the metabolic standpoint. The shoulder yoke is clearly the best device for carrying the load. The worker is standing upright in normal posture with the loads at his sides, either supported by the hands or partly by the shoulder yoke. The possibility of alternating the distribution of the load on the members in this way is part of the story. All the inefficient methods involved something that interfered with normal upright posture. For example, with the tray carried on one hip the worker has to bend sideways, and one lung is cramped so that the breathing mechanism cannot function normally. The general principle brought out is that devices for carrying loads should interfere as little as possible with normal upright posture.

Local fatigue. Some devices may be developed in the interest of eliminating fatigue of a limited muscle group. Take such a simple thing as a crank handle. Many workers spend their lives turning cranks. It was shown experimentally that some handles were more fatiguing than others. These results were obtained by having the subjects turn a crank at a constant rate against a constant load, testing them before and after with a dynamometer to measure the strength of grip. A perfectly cylindrical handle produced undue tension on the forefinger and the experiment indicated that a little indentation for the forefinger was advantageous. Similarly, a screwdriver handle that was cylindrical with a rounded end was superior to a straight cylindrical or various pear-shaped types.

Adjustment to Individual Differences

Stature. Even though employees are reasonably well adapted to a job in terms of their aptitudes, it is often desirable to make some adjustments in the work itself in the light of their individual differences. One obvious point is the stature of the worker. If the work is too low, fatigue in the lower portion of the back results, and if the work is too high for the individual worker, there is strain in the shoulder muscles. The solution, naturally, is to have adjustable stools or adjustable benches. Some studies of the actual power used by the worker in doing a task revealed that for certain kinds of work, most of the power was consumed in moving the arm itself. For this type of work small operators who did not have a very heavy arm to move would be just as good as large, strong operators. Where a large proportion of power was required in moving the work, small stature was a handicap.[21]

---

[21] Koepke, C. A. and Whitson, L. F., "Summary of a Series of Experiments to Determine the Power and Velocity of Motion Occurring in Manual Work," *Journal of Applied Psychology,* 1941, 25, 251–264.

Handles may be considered again from the standpoint of individual differences. If two people grasp the same plastic material, the imprints of their hands will differ. Perhaps one squeezes more with the middle finger than does the other person. Sometimes a tool with a wooden handle which has been used for a lifetime by a given individual actually is worn to conform to the shape of his hand. Handles of this type can be made artificially in the interest of efficiency. All that is necessary is to make a cast of some plastic material and use this as a matrix to make a wooden handle that just fits the individual hand. If the man grasps this handle through long periods, it is probable that the distribution of muscular effort in the different fingers will conform to that which is most favorable for that individual. Devices of this sort have been developed for workers in a post office who were canceling stamps by hand and for streetcar motormen who were grasping a handle on a controller throughout the day.

Sorting operations. There are jobs which consist of sorting material into compartments. There are indications, experimentally, that persons differ in their facility in making motions in different directions. When they were standing in front of an upright box of compartments, some people were shown to be more effective when sorting toward the upper right quadrant of the box and others toward the lower right. The practical point is that in any operation where sorting of this type is involved, it is well to have the compartments which receive the heaviest consignments in the general direction in which the individual operator is most effective in making his motions. Also, when persons were transferring articles from a tray to a box, some subjects were quick in making long, extended movements, whereas others were quick and accurate in short movements. These individual differences could readily be detected and capitalized on accordingly.[22]

Handedness. Many of the things discussed previously regarding arrangement of parts would obviously need to be reconsidered with left-handed workers. If the work place is standardized for right-handed workers, it may be undesirable to use left-handed workers at all, unless the work place can be changed for their benefit. Along this same line is the finding that on an assembly operation right-handed workers were more efficient when the belt came toward them from their left, and it was better for left-handers if the belt came in from the right. This would complicate the organization problem, but it might be possible to build up a small squad of left-handed persons to work on the same conveyor belt.

---

[22] Balchin, N., "Movement Study in Packing," *Industrial Psychology*, 1931, 5, 274–275.

Machine speeds. In some operations the rate at which the operator works is governed by his own tempo. In other cases it is controlled by the machine as, for example, on an assembly line or with a hand feed dial machine. Even though the workers are all above a certain minimum of aptitude and proficiency in the job, there may be differences between them when the machine is running at a constant speed. Perhaps some of them would be more efficient at a higher speed. Such individual differences were brought out in a British investigation in which the workers were feeding candy from a tray into slots in a disk on the wrapping machine. Each week the speed of the machine was varied and a record of output kept for two workers. Obviously, if the speed was too rapid, the worker missed some of the slots and production dropped. The results are summarized in the left portion of Table 31. Production at the lowest speed of 68.5 is taken as 100 per cent. Both workers *A* and *B* are most effective at 81 slots per minute, but if the machine goes beyond that, worker *A* drops off much more than does *B*. Obviously, it would be undesirable for *A*'s machine to be set at the highest rate.[23] Another problem is the possibility of changing the speed of the machine during the working spell. Conceivably, a person might get tired as he progressed and not be able to operate at the higher rate. This was brought out in a similar experiment with much the same sort of industrial operation. These results for two other workers appear in the right side of Table 31. In the upper section the speed was kept constant at 220 but the four-hour spell was divided into three equal portions and production recorded for each third

TABLE 31

Machine Speeds and Output *

Machine Speed	*Relative Output*		*Speed*	*Production*	
	Worker *A*	Worker *B*		Worker *X*	Worker *Y*
68.5	100	100	220	92	86
74.0	101	104	220	89	86
81.0	108	109	220	85	80
85.7	103	107	240	90	85
			220	93	89
			200	95	92

* Wyatt

---

[23] Wyatt, S., "Machine Speed and Output," *Journal of the National Institute of Industrial Psychology,* 1927, 3, 407–414. Also Wyatt, S. and Langdon, J. N., "The Machine and the Worker," *Industrial Health Research Board, Report No. 82,* 1938.

of the spell. Both workers *X* and *Y* dropped off appreciably in the last portion. In the other part of the experiment, shown in the lower section of the table, the spell was divided into the same three parts, but the machine speed was changed, starting at a considerably higher speed of 240 and ending at 200. The average speed would still be 220. Under these conditions the production increased as the spell progressed and, on the whole, was appreciably higher than the over-all production under the condition of constant speed throughout.

Rhythm

General effectiveness. Many bodily processes go on in rhythmical fashion. There is a fundamental economy in this because a repetition of the act is possible without necessarily having a repetition of the impulse. One does not have to make a decision each time. One does not think, "right, left, right, left" for the successive steps; but taking one step is, in a way, a stimulus for the next. Therefore, if an industrial process can be carried out rhythmically, there is a resulting economy. This was brought out in motion study and is laid down as one of its basic principles. It has nothing to do with a rhythmical accompaniment of the work, which is not necessarily synchronous. A study of gum-chewing was made to see whether it had any facilitating or unfavorable effect on tasks which were performed at the same time. With nine such tasks, such as typing, no unfavorable effect on production was evidenced as a result of the chewing, and there was, in some instances, a reduction in tension which was interpreted by the investigator as favorable.[24] Evidently, there was no serious conflict in the rhythms. However, with more pronounced rhythms (music) a conflict between the rhythm of the environment and the rhythm of the work itself may be serious.

Dynamogenic effect. Rhythmical activity has a further reinforcing effect termed "dynamogenic." This simply means that one stimulus tends to reinforce response to a different stimulus. If someone is squeezing a dynamometer to determine the strength of grip, the results are enhanced if he smells a pleasant odor at the same time. Rhythm operates in this dynamogenic fashion. The vigor with which a group will march when the band is playing is a case in point. Frail girls will dance for hours with the rhythmical reinforcement. It is probable that many of the great works of antiquity were constructed in rhythmical tempo. One case of industrial production may be cited. A group of workers were tamping cobblestones with large mauls after the foundation had been laid for a roadway. The foreman beat time with a crowbar against the curb so that the whole group was operating rhythmically. No statistics were obtained but it was perfectly obvious to an observer that the cobblestones were driven home with much more vigor than usually was the case.

---

[24] Hollingworth, H. L., "Psycho-Dynamics of Chewing," *Archives of Psychology,* 1939, 239.

Individual differences. There are differences in the rhythms which different persons find most effective, for instance, people walk at different gaits partly because of the length of the limbs and general muscular adjustment. In the laboratory when subjects are required to lift a weight periodically at a "comfortable rate," an individual usually hits a fairly constant rate, and when the experiment is repeated three years later, each employs almost identically the same rate he used at the outset.[25] Evidently, there is something about the individual's psychomotor adjustment which makes a comfortable rhythm a fairly constant thing for him. Some observations were made of farmers doing various operations—mowing, threshing, cutting tops of sugarbeets, spreading fertilizer, digging potatoes. The rhythms of the operation differed from worker to worker, but were relatively constant from one period to another with the same individual. These natural rhythms tended to persist in spite of weather, or rest pauses.[26] These differences in natural rhythms tie in with the previous discussion of machine speeds and may explain some of those results. They are more pertinent, however, where the individual is setting his own pace. Another finding is that some workers prefer to have a rhythm imposed upon them, whereas others prefer to set their own and are annoyed by the forced rhythm. This suggests that it might be well to investigate rhythm along with other aptitudes in placement problems.

Social Facilitation

Experiments with children. The normal industrial procedure is for numerous people to work simultaneously in proximity to one another. The question arises as to whether they derive any good or bad effect from the presence of fellow-workers. It has sometimes been suggested that they distract each other so that it would be preferable to isolate them by partitions or by putting them in separate rooms. On the other hand, it is proposed that, since we are social animals, some benefit is derived from the presence of other individuals. Efforts have been made to answer the question empirically. One of the extensive early studies was conducted with children[27] who made dots with a pencil at designated positions on a large sheet of paper working individually, in groups of two, and in groups of sixteen. In the largest groups the average child did 8.5 per cent better than when he was working alone. In another series the children grasped a dynamometer, either individually or in pairs. The average score for children in pairs was about 10 per cent superior to what it was when they were alone. In a memory test they pronounced syllables in pairs and tried to associate the two words of the pair together so that when the first word was given, they could recall the second. Learning words was 33 per cent more effective in the group situation. With reference to the dotting and the memory test, a further trend was found for the inferior individuals to profit more by the social facilitation than did the superior individuals. In memory, for example, the seven best workers improved only 7 per cent on the average because of social facilitation, whereas the seven worst individuals improved 82 per cent.

---

[25] Cathcart, E. T. and Dawson, S., "Persistence, a Characteristic of Remembering," *British Journal of Psychology,* 1928, 18, 262–275.

[26] Koch, H., "Untersuchungen über den Individuellen Arbeitsrhythmus an Landarbeiteren," *Psychotechnische Zeitschrift,* 1933, 8, 17–24, 58–65, 89–95.

[27] Moede, W., "Einzel und Gruppenarbeit," *Praktische Psychologie,* 1920, 2, 71–108.

Experiments with adults. Some studies with adults do not show as clear a tendency as those cited. For example, three coordination tests were given under careful laboratory conditions with the subjects working alone or in groups of three. In the former case, they were in separate rooms and started and stopped the assigned task at a buzzer signal. In the latter condition, they were seated around a table doing the same task, again in response to a buzzer. The experimenter was in a different room, operating the switchboard, and everything was recorded electrically. The tests included tapping successively three discs at the vertices of an equilateral triangle; tapping with the tip of the forefinger up and down between contacts about an inch and a half apart; and the conventional steadiness test in which a small stylus is held in holes of decreasing magnitude in a metal plate. College students served as subjects for this experiment, and the results were entirely negative. The average performances under the two conditions showed no significant differences.[28]

On the other hand, another investigator, using the steadiness test, found a fairly large average difference in favor of the social facilitation with a critical ratio of 2.2, which indicates marginal significance. In this same investigation simple visual reaction time was measured, with four subjects operating four keys simultaneously in response to the same stimulus. The average time in the group was .242 seconds and alone, .268. The difference was 2.6 times its standard deviation, which brings it close to significance.[29] It is possible that the groups in this latter study were a little better structured than those in the former. The participants were better acquainted, and more general interest was manifested in the performance in the group situation. Another possible variable in such experiments is the fact that when subjects are working in isolation, but know that other people are working at the same thing simultaneously elsewhere, they may not be strictly in isolation. Perhaps this would be more apt to occur with adults than with children and would account for the more equivocal results. This point actually was demonstrated in experiments where the subjects were doing multiplication and serial associations and solving analogy problems. They performed alone as in the experiment described above, but when other subjects were performing simultaneously elsewhere in the same building, and, too, they performed when they came to the laboratory by themselves. They also performed the task in small groups. The performance when they were alone but knew that others were working simultaneously took an intermediate position between performances in the other two situations. In other words, they were not alone in the absolute sense, and were not totally without social facilitation.[30]

---

[28] Wolfle, D. L., in an Unpublished Study. Ohio State University.

[29] Clark, K. E., in an Unpublished Study. Ohio State University.

One study of social facilitation under actual industrial conditions has been reported. A number of variations were introduced into the experiment, but one is of interest in the present connection. Women making rubber-soled shoes of the gymnasium type worked alone, doing only one operation on the shoe, or sat around a table together, each one doing the same operation on the shoe. The difference here was 10 per cent in favor of social facilitation. Data are not available as to whether the difference was statistically significant.[31]

The foregoing indicates a favorable effect of social facilitation in industry. There is a further possibility that, quite apart from social stimulation at the moment the work is being done, there may be a carry-over of favorable attitudes from previous social contacts. For example, the usual trend was demonstrated with 'teen-aged girls of borderline intelligence learning a pencil maze, either alone or in pairs. However, what was especially interesting was that social stimulation in an initial series made for superior performance in a later series without the social stimulation. This is analogous to the way that pleasant outside activities in a person's everyday life are reflected in more effective work under industrial conditions.

The above studies have dealt primarily with actual motor performance. There are occasions when the work may involve something in the way of judgment. One finding is of interest in this connection—a trend toward conformity when judgments are made simultaneously with other people. When subjects were judging weights by hefting them they made fewer extreme judgments when they were operating in a group than when they were alone.[32] The practical consideration might be whether conformity was desirable or undesirable in the type of work involved.

---

[30] Dashiell, J. F., "An Experimental Analysis of Some Group Effects," *Journal of Abnormal and Social Psychology,* 1930, 25, 190–199.

[31] Lorenz, E., "Psychologie der Industriellen Gruppenarbeit," *Zeitschrift für Angewandte Psychologie,* 1933, 45, 1–45.

Team work. There are situations where two or more industrial workers operate the same mechanism as a team. One pushes the material in the front end of the machine while the other pulls it out the rear, or they lift the material simultaneously. A problem arises as to the effectiveness of a team as related to the individual competence of the members. This was studied with the task of lifting a weight in time with a metronome by pulling upward on a bar. Sometimes one person did this alone with a load of 41 kilograms, sometimes two persons with a load of 82, or three persons with a load of 123. Production was determined in terms of kilogram-meters. Teams were constituted with considerable variation in the comparative individual efficiency of the members. Interest was in what happened in the group as compared with the efficiency of those same persons when operating individually. The results for teams of two members are shown in Figure 16. The vertical axis of the curve represents the group performance taken as a per cent of the total

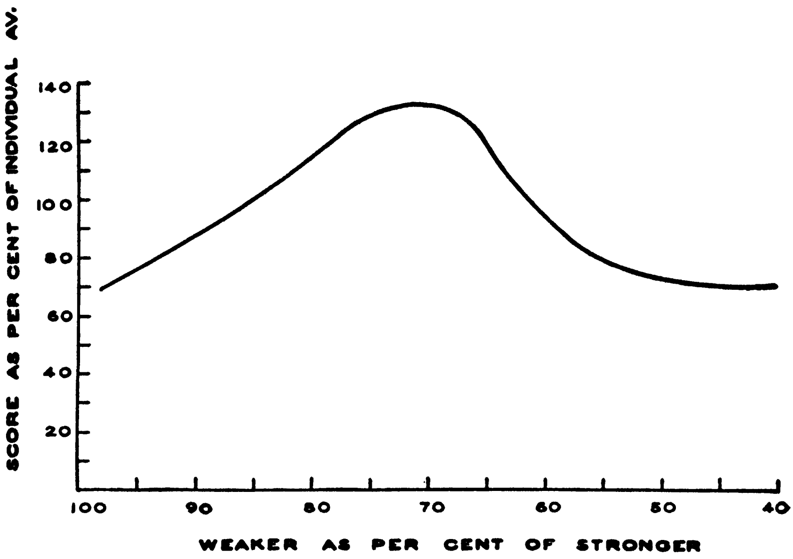


Figure 16. Effectiveness of Team as Related to Relative Strength of Members.

---

[32] Farnsworth, P. R. and Bahner, A., "A Note on the Attitude of Social Conformity," *Journal of Social Psychology,* 1931, 2, 126–128.

of the performance of the two members when working individually with the 41 kilogram load. The horizontal axis indicates the per cent which the weaker member of the team is of the stronger member in the individual series. When the two members are almost equal in strength, their joint performance is only about 70 per cent of the total of their individual performances. The optimal condition prevails when one individual is about 65 to 70 per cent as effective as the other. The explanation is that when they are about equal in ability, both try to lead, and thus there is conflict in tempo and resulting loss in efficiency. If one is appreciably superior, he sets the pace, and the other does not try to oppose him. A somewhat similar study involved different numbers of individuals pulling together on a rope. Two individuals should do about twice as much work as one, but actually did about 10 per cent less than expectation. When a third person joined the group, the efficiency dropped off another 10 per cent below what would have been expected. As more people were added, there was an increasing tendency for the individual to relax and let the others carry the load. This amounted roughly to about a 10 per cent loss with the addition of each worker.[33]

Summary

A worker learning a new job is subject to the basic laws discussed earlier in connection with school problems. Repetition is important, but initial emphasis should be on accuracy with stress on speed a bit later. The law of effect has both the reward and punishment aspects. Experiments indicate a slight superiority of the former, and in the industrial situation there is the additional consideration that reward promotes morale. Conditioned-response mechanisms may be involved in industrial learning, particularly in operations where timing is important. Incentive has important contributions to learning as well as to industrial efficiency in general. Wages constitute the most obvious incentive and piece rates are more effective in this respect than time rates. Other factors that contribute favorably to incentives are the initial reception of new employees, the attitude of the supervisor, working conditions, prestige, and the knowledge of one's progress. In some surveys opportunity for advancement was very high on a list of incentives. Competition is also effective, particularly competition with an individual rather than with a group. A more immediate goal produces greater incentive than a more remote one.

Partial activity contributes to effectiveness of learning and can be promoted by the instructor who calls attention to particular difficulties.

---

[33] Köhler, O., "Über den Gruppenwirkungsgrad der menschlicher Körperarbeit und die Bedingung optimaler Kollektivkraftreaktionen," *Industrielle Psychotechnik*, 1927, 4, 209–226.

Transfer of training depends on the identical elements in the two jobs. Refresher training is sometimes in order for older employees who need to be brought up-to-date on recent techniques. The course of industrial learning may be shown graphically, and the learning curve is typical. If a plateau is characteristic of the curve for a particular job, it is well for the supervisor to be alert at the time when the plateau is expected and try to provide additional incentive at that point.

Some special devices may contribute to more effective learning. One of these is moving pictures which demonstrate the operation in slow motion. Other devices concentrate on some crucial aspect. Still other arrangements show the worker just how he is getting along in detailed aspects of his work—the tension which he is exerting or the position in which he holds a tool. Short-exposure apparatus is useful in enlarging the range of perception with a view to greater effectiveness in inspection work.

The vestibule school provides instruction for the beginner under a skilled teacher and with emphasis upon learning rather than production. Apprentice training should take account of individual differences, letting the man progress as rapidly as his competence warrants and evaluating this competence by achievement tests.

Many foremen are experienced and effective workmen but lack skill in handling people and ability as teachers. A foremen's training course may well include, in addition to the usual technical things about materials and production, some psychological considerations in the field of morale. Instructional methods in such courses should comprise discussions rather than lectures. Case study material distributed before the discussion is helpful.

A sales-training program should be based on analysis of the job by an observer who accompanies the salesman and notes exactly what happens. Many sales-training programs embody the following four aspects: studying the prospect in advance, both as to whether he is in the market for the product and with reference to his interests and avocations which might facilitate the approach; the product sold, particularly if any demonstration is necessary or if the product is quite technical; the sales policies of the concern, which must be interpreted to the client; the actual selling job with a transition period of accompanying an older salesman. Moving pictures or transcriptions of good and bad sales interviews may be helpful in training. Conventions can be made worth-while projects by breaking them into round tables under discussion leaders. Checks on the progress of the trainee may be made in the retail field by service shopping where someone impersonates a customer. In other jobs, it is possible to listen in on the telephone or microphone where employees deal with the public. Very simple questionnaires have been used to follow up a salesman's call and secure the judgments of clients.

Related to the problem of training is the question of what actually should be taught—that is, the most efficient methods of work. One procedure for determining these is motion study, which takes moving pictures of the operation and attempts to eliminate unnecessary motion. Various principles making for economy of movement have been worked out with these techniques. In some instances striking reductions in time of the operation have been effected in this way. Motion study, however, should be tempered slightly in view of the fact that people differ markedly in psychomotor equipment. Minor adjustments in methods may be desirable in the light of this. Sometimes a completely standardized motion will become unduly monotonous in comparison to one which is more varied.

Some economy may be achieved by better arrangement of working materials. The location of tools, or containers, or even tables may be important. The arrangement of the keys on the typewriter is a present problem. The standard keyboard does not load the fingers or the hands in proportion to their actual effectiveness.

Unnecessary decisions may be minimized by having the parts to be assembled prearranged by an unskilled helper in a standard order. Emotional disturbances, if present, may be reduced. Basal metabolism techniques indicate that the best method of carrying loads by hand is one which interferes as little as possible with normal upright posture and lets the breathing mechanism function normally. Local fatigue, for example, in the hands, may be studied with a view to determining the most effective way to minimize it.

Some adjustment to individual differences such as stature is desirable. Another instance is the handle on a tool which is modeled to conform to the individual's hand. In sorting operations some workers are more effective in sorting in certain directions, and it is well to arrange for the heaviest consignments to be in those favored directions. Some cognizance should be taken of handedness in the arrangement of materials or tools. Machine speeds sometimes govern the tempo of the work, and, even though individuals are reasonably competent, some of them can operate at a higher machine speed than others without loss of efficiency or undue fatigue. In one instance better results were obtained if the speed of the machine decreased during the working spell.

Rhythm has an element of economy because a new stimulus is not needed for each successive act. Some industrial operations can be arranged to capitalize on this fact. There is also a dynamogenic effect resulting from rhythm. Individuals differ in the rhythms at which they are most effective. There appears to be a natural rhythm for the individual in a given type of motion which is relatively constant for him but different from that of other persons.

Social facilitation is a mechanism whereby the presence of other persons doing work simultaneously stimulates the individual to greater efficiency. This was found quite clearly with children doing various tasks, and, in some instances, with adults. One study, at least, has demonstrated social facilitation under industrial conditions. When persons are working together as a team, the operation is most effective if the two members are not of exactly equal competence, because then they both try to set the tempo. If one of the pair is only 65 or 70 per cent as effective as the other, he follows the other, who sets the pace to the over-all benefit of the team. A further point is that as the team is enlarged, there is a loss in efficiency with each added member.

19

ENVIRONMENTAL FACTORS AND INDUSTRIAL EFFICIENCY

Intensity of Illumination

THE DISCUSSION OF industrial efficiency so far has dealt with methods of training and with the organization of the work itself. Our next consideration relates to environmental factors. The actual situation in which the work takes place, quite apart from the work itself or the methods, has a bearing on efficiency. The principle variables are illumination, ventilation, noise, and music. The over-all importance of adequate illumination is obvious. Workers who cannot see the hazards get hurt, and workers who cannot perceive sufficient detail in the material with which they are working put things in the wrong place, make incorrect motions, and lose time. A committee of experts dealing with lighting of factories and workshops in Great Britain reported increases in accidents attributable to poor artificial lighting as compared with daylight amounting to the following per cents for typical industries: Docks, 51; Textiles, 46; Drink, 35; Engineering, 32; Shipbuilding, 22; and Foundries, 6. The over-all average was about 25 per cent.[1] An insurance company finds 10 per cent of industrial accidents caused by improper illumination and another 14 per cent in which lighting was a contributory cause.[2] Some studies of the effect of increased illumination on actual production will be brought out presently. Increases of 20 per cent are not at all out of the ordinary.

General visual effectiveness as related to intensity. One of the most obvious variables in illumination is its intensity. Changes in the interest of increased efficiency may be as simple as replacing a 25 with a 50 watt bulb. Considerable experimental work has been done to determine more exactly the relation between differences in intensity and visual efficiency. Various techniques have been used, but the over-all result with almost any technique follows a typical trend. This is shown in the uppermost curve of Figure 17. This curve is hypothetical, but is very similar to curves obtained empirically with different techniques. The abscissa represents the intensity, and the ordinate represents the visual efficiency. At low intensity levels a small increase in illumination produces a large increase in efficiency. As the higher levels of intensity are approached, the effect of slight changes in illumination is less marked. Finally, beyond a certain point, further increase in intensity has no appreciable effect as far as visual efficiency is concerned. Obviously, it is an unnecessary expense to go beyond the point where the curve levels off.

---

[1] Vernon, H. M., *Accidents and Their Prevention,* page 85. New York: Macmillan, 1937.

[2] Hannum, J. E., "Using Light to Lessen Fatigue," *Industrial Psychology,* 1927, 2, 341–347.

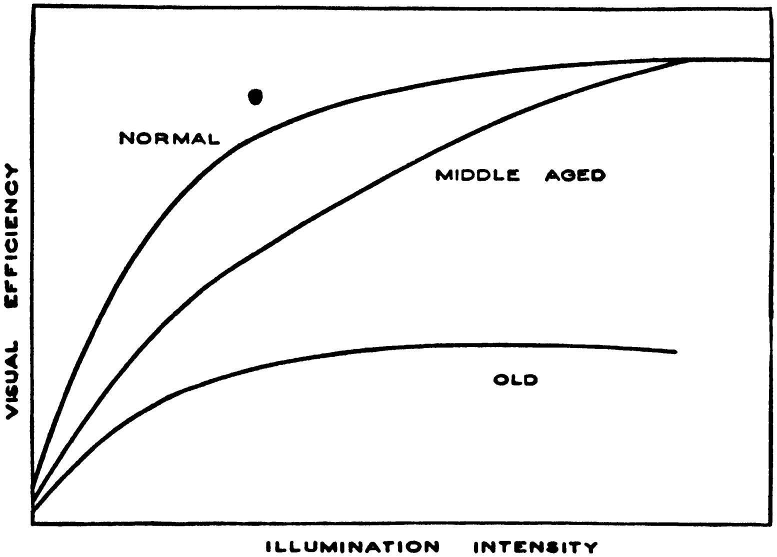


Figure 17. Intensity of Illumination and Visual Efficiency.

Requirements of specific jobs. The practical problem is what to do for a specific job. The requirements naturally depend on the visual demands of the job. A comparatively low level of illumination is adequate for a hallway, but much higher intensity is required for mounting tiny filaments in vacuum tubes or picking up minute threads with a hook in the manufacture of silk hosiery. Difficulty in discriminating visual detail can often be remedied by increased illumination.

There are various codes and recommendations of minimum intensity for different kinds of work. Sometimes these are actually specified by law and at other times, they are the recommendations of engineers or scientists. Some of them have been worked out empirically by plotting curves similar to those in Figure 17 for a given type of work, and others have been the result of more casual observation. One gets the impression from reading specifications that much depends on the background of the person making these specifications. For example, persons who have had some connection with the electrical industry seem to recommend higher intensities than scientists who have studied the matter with purely esoteric interest. One of the former, for example, recommends 30 foot-candles for reading a newspaper, whereas one of the latter states that it is possible to read comfortably with 7 foot-candles, which is about the point where the curve levels off, and recommends 15 or 20 as entirely adequate.

The results of such studies, also, depend somewhat on the technique used. Some of these techniques will be mentioned very briefly. A broken circle is widely used as a test object and is rotated so that the break is up, down, left, or right. The subject is required to state in which direction the break occurs as a check on whether or not he sees the object adequately. The size of the circle, and the break, and the reflection coefficients of the test object, and the background are all controlled. It is possible to vary the size of the break or the distance of the object from the eye and determine under given conditions the minimum intensity at which a subject can discriminate adequately. With the other variables constant, it is possible to ascertain the shortest exposure time in which the subject can discriminate the test object. Some investigators have used speed-of-reading with the subject perusing standard material at his own rate or taking actual reading tests, which involve short paragraphs, one word of which is wrong, and the subject has to mark the wrong word. Other techniques involve the rate of blinking while reading standard material. Another possibility is to measure general muscular tension while doing visual work. There often is a tendency toward such tension as gritting the teeth or frowning during a difficult intellectual task. Such a tendency was employed in a technique where the subjects read a book and had to press a key each time they turned the page. The finger actually was resting on this key all the time and the pressure exerted was recorded continuously. This record was used as an indicator of the visual difficulty of the task.[3] An unsystematic approach to the problem is to refer to the worker himself for preferences in illuminating conditions.

---

[3] Luckiesh, M. and Moss, F. K., "A Correlation Between Illumination, Intensity and Nervous Muscular Tension Resulting from Visual Effort," *Journal of Experimental Psychology,* 1933, 16, 540–555.

Additional local light may be available so that he can adjust the intensity himself. The difficulty is that he is liable to form the habit of turning on the supplementary light whether he needs it or not, even when there is bright sunlight.

Methods like the foregoing have almost all shown the trend indicated in the upper curve of Figure 17, but, of course, they level off at different intensities for different types of visual task. The results are complicated by such variables as the difference in the coefficient of reflection of the details of the work and the background, but the over-all results range from something less than a foot-candle[4] for illuminating yards and roadways, up to 30 foot-candles or more for fine work such as threading a needle. If a business concern is interested in increasing visual efficiency without unduly increasing cost of illumination, it may be in point to do their own investigating because of the marked disagreement among authorities.[5]

Improvement in industrial operation. In many instances an increase in intensity of illumination actually has produced corresponding changes in industrial efficiency. Studies have been reported of such miscellaneous activities as finishing pulleys, working on metal bearings, carburetor assembly, iron manufacture, buffing shell sockets, sorting letters, making piston rings, and key-punch operating. In most instances the illumination was increased two- or threefold, and the improvements in efficiency ranged from 4 per cent up to 35 or even higher. In one summary of results for nineteen jobs the average improvement was 14 per cent. In another report on six operations the average was 15 per cent, and the increase in cost of lighting was only 2 per cent of the payroll. The change was obviously justified from the cost standpoint.[6] In summarizing numerous studies Troland concluded that for the great majority of industrial operations an illumination intensity in the neighborhood of 10 foot-candles was adequate. However, some account should be taken of the attitude of the worker. People differ in their preferences for illumination intensity. For example more people prefer a range between

---

[4] A rough notion of the relation of foot-candles to ordinary experience may be seen from the fact that to produce 20 foot-candles, a 25 watt lamp should be about 16 inches from the work, a 50 watt lamp 27 inches, a 100 watt lamp, 52 inches; and to get 25 foot-candles, the corresponding distances for those three sizes of lamps would be 9, 20, and 34 inches.

[5] For a conservative estimate on these points and a summary of some of the studies see Tinker, M. A., "Illumination Intensity," *Journal of Consulting Psychology*, 1937, 3, 11–20.

[6] Luckiesh, M. and Moss, F. K., *The Science of Seeing*, page 277. New York: Van Nostrand, 1937; Also Troland, L. T., "Analysis of the Literature Concerning the Dependency of Visual Function upon Illumination Intensity," *Transactions, Illuminating Engineering Society*, 1931, 26, 107–196.

10 and 15 foot-candles than any other level for comfortable reading. About 26 per cent chose this range, and another 21 per cent preferred 15 to 20 foot-candles.[7] Some flexibility may be desirable in the way of letting the worker turn on additional illumination when he needs it or thinks he needs it.

Note should be made also of the possibility of utilizing more daylight, which is free. This may be implemented by special construction of the building, but sometimes soap and water on the windows go a long way. There have been instances where a few months without washing reduced daylight illumination by 50 per cent. There is also the matter of reflection from the walls and the ceilings. Walls that are dark or covered with smoke absorb a lot of light that otherwise might reach the working place.

Older workers. The average age of the population is increasing because people now live longer. There is an increased interest in industrial, and other, adjustments of elderly people. Many of them prefer to continue their work, but sometimes they are retired for visual reasons. One study of visual efficiency at different ages is pertinent in this connection.[8] The subjects were tested with the standard broken circle under different intensities of illumination. Three general types of curves resulted, which are shown in Figure 17. The curves are not exact reproductions from the experimental data, but show approximately the trend revealed by some of the empirical curves. The results fall into three general patterns. The first is the ordinary curve—the uppermost one in the figure. The second is the intermediate curve in the figure which gives results for middle-aged people. It shows a slower rise but eventually it reaches about the same maximum as the curve for the younger folks. The third curve is for still older persons and rises more slowly and levels off at a lower maximum. The interesting point is that middle-aged people are handicapped appreciably at the lower intensities but when given sufficient intensity of illumination they are as good as anyone. The industrial and social implications are obvious. Many middle-aged people could be retained in industrial jobs by the simple expedient of giving them a few more watts. In this way many who would otherwise be industrial casualties can be salvaged and contribute many years of useful work to the benefit of industry and of their own morale.

General correction of visual difficulties. Passing mention should be made of the fact that some workers have difficulty in perceiving their work adequately because of visual defects which can be corrected by appropriate glasses. Not everyone is aware of his own defects nor has sufficient insight to go and get them fixed. Some industrial concerns conduct visual surveys of their personnel and insure that any outstanding defects receive the appropriate optical correction. Instruments have been devised for rapid examinations of this sort.[9]

---

[7] Ferree, C. E. and Rand, G., "Good Working Conditions for Eyes," *Personnel Journal,* 1936, 15, 333–340.

[8] Ferree, C. E. *et al.,* "Sight and Intensity of Light," *Personnel Journal,* 1935, 14, 18–25.

Special glasses for fine work. There are some industrial operations which involve such fine discrimination that even with high intensity of illumination a worker has difficulty unless the work is brought quite close to the eyes. When discrimination is difficult, the two normal recourses are to increase the illumination or decrease the distance from the work so that the image on the retina becomes larger. This latter procedure may involve bending over with resulting postural fatigue and may also cause ocular fatigue after working for long periods. A solution that has proved successful in some cases is to provide the workers with special spectacles which they wear only during the work and which have the effect of increasing the size of the retinal image without the necessity of bending the body forward. One job in hosiery manufacturing involved picking up fine threads on needles, and, with the use of special spectacles of the sort mentioned, two experienced girls increased their production 10 per cent and an inexperienced girl improved 27 per cent. Similar results were found in mounting filaments in vacuum tubes with an average improvement of 10 per cent, and in a textile operation a gain of 18 per cent resulted.[10] For fine-gauge loopers in making hosiery, those who wore the spectacles had an average increase in production of 10 per cent over a control group, and beginners wearing the spectacles reached the peak of production more rapidly.[11] Installing the glasses, however, was an individual matter, and if the worker had other visual defects, they were corrected in the glasses provided. Moreover, not everyone can wear the spectacles successfully, and their installation should be handled by an expert. There is the further problem of the attitude of the employees toward this arrangement. In one British factory it was installed experimentally for a period, and the employees were then given a choice of going back to the old procedure or continuing with the spectacles. They preferred the latter although they did dislike the way the glasses decreased pulchritude.

---

[9] *Cf.* Tiffin, J., *Industrial Psychology,* Chapter VII. New York: Prentice-Hall, 1947.

[10] Weston, H. C. and Adams, F., "On Relief of Eye Strain Among Persons Performing Very Fine Work," *Industrial Fatigue Research Board, Report No. 49,* London, 1928.

[11] Tiffin, *op. cit.,* page 234.

Distribution of Illumination

Fatigue of ocular mechanism. Another illumination variable is its distribution. At one extreme is the bare lamp a few inches in front of the worker's face and at the other a completely indirect system with all the light reflected from walls and ceiling. A threefold classification in this respect is common. In the direct system the light comes directly from the source to the work. The source may be a bare lamp, or it may have a shade which reflects some of the light downward, or it may have a translucent globe around the lamp. In the indirect system the lamp is above an opaque bowl and is not visible to the worker, and all the light is reflected upward from the inside of the bowl to the walls and ceiling, and from there downward to the work. The semi-indirect system is intermediate and has the bowl underneath the lamp as in the indirect type, but the bowl itself is translucent and lets some light filter down through directly to the work. Numerous variations of these types are available in the way of shades, globes, and fixtures, but as far as psychological aspects are concerned, these three types suffice. The indirect system, if properly designed, has a very uniform distribution of the lighting so that one part of the room has about the same intensity as another part. The direct system, on the other hand, has areas near the sources which are quite bright and other more distant areas which are comparatively dark.

One important problem in connection with distribution is the effect of these various systems on the fatigue of the ocular mechanism. Extensive experiments have been conducted on this problem.[12] The subjects sat under standard conditions with a head rest and looked at a small test object such as two parallel lines a millimeter apart or the small letters li as they appear in ordinary printing. The test object was lighted in standard fashion throughout, and was at such a distance that it was difficult for a given subject to see it clearly continuously. The subject watching this test object noted whether it was clear or whether it blurred and pressed telegraph keys accordingly, which recorded electromagnetically. It was possible to determine subsequently the proportion of the observation period that the test object was clear or blurred. Observations were taken through a period of three minutes rather than for a brief interval, because, in the latter case, the eye might whip itself up to a higher level of efficiency momentarily. If, however, the eye was somewhat fatigued, it would be unable to spurt for a three-minute period. The initial distance of the test object was determined for each subject so that the ratio of the time clear to the time blurred was about 3.5. Once this distance had been ascertained for a given subject, it was maintained constant through the experiment. The general procedure was to make an initial test of this sort, let the subject read under a given condition of illumination for two or three hours, and then take another prolonged acuity test. The difference between the two tests reflected the effect of the intermediate period of reading. The decrease in the proportion of the time the object remained clear could be noted as a percentage decrease, and the larger this was, the more unfavorable was the illuminating condition. The over-all trend of all the experiments may be seen in Table 32.

---

[12] For a summary and references to other articles see Ferree, C. E. and Rand, G., "The Power of the Eye to Sustain Clear Vision Under Different Conditions of Lighting," *Journal of Educational Psychology,* 1917, 8, 451–468.

TABLE 32

Percentage Loss of Ocular Efficiency from Reading under Various Conditions of Illumination *

	Indirect	*Semi-indirect*	*Direct*
General—three hours	9	72	81
General—two hours	10	34	37
Six fixtures visible	9	72	81
Four fixtures visible	6	37	58
Two fixtures visible	8	22	31
No fixtures visible	7	19	23
Eye-shade, dark lining	33	35	33
Eye-shade, light lining	10	12	11

* Ferree

The first two rows give the general results for a considerable variety of conditions. Reading for three hours with indirect illumination produces only a 9 per cent loss, whereas with direct illumination this amounts to 81 per cent. The results are less striking with a reading period of two hours but the trend is similar. Incidentally, results with daylight are very much like those with indirect artificial light. The results are not attributable to the intensity of the light because it was controlled so that each system gave the same over-all intensity on the page which the subject was reading. The experiment was repeated also at different intensity levels, and the results were quite consistently like those indicated in the table.

The question arises as to the actual mechanisms which produce this result. There are bright sources in the margin of the visual field in reading or working under a direct lighting system which are apt to attract the person's attention. If he fixates the source, the lens of the eye is focused upon it automatically by the ciliary muscle. Then his attention returns to his work or book, and the ciliary muscle re-focuses the lens for the near object. This pulling and hauling in the ciliary muscle produces fatigue. The role of this mechanism in producing the experimental results cited above was checked by supplementary experiments in which the subject sat in different parts of the room. The data are summarized in the next four lines of Table 32. In one instance the subject sat where six light fixtures were in front of him and in the periphery of his vision. The results are indicated in the third line of the table, which incidentally is the same as the over-all results given in the first line. In subsequent series the subject was moved down the room to a position where two of the fixtures were behind him and only four visible, then to a position where only two were visible, and finally, where none were visible. The table shows that it made little difference where the subject sat for indirect illumination. There are no visible bright sources with such an installation. For the other types, however, the incidence of fatigue was related directly to the number of fixtures visible. This fact corroborates the point made above that it is these bright sources stimulating the focusing mechanism of the eye that cause the trouble. When fewer of them are visible, there is less trouble.

A common solution for this type of difficulty is to wear an eye-shade. An investigation was made of different types of eye-shades, using the same general technique. The results appear in the last two lines of Table 32 and should be compared with the first line. Two types of opaque shades were used, one with a dark lining and the other with a light lining. The data show that, with the dark lining the results are none too favorable, although with the semi-indirect and direct systems, this shade is better than none at all. That particular shade is worse than no shade under the indirect system. The opaque shade with the light lining, however, is favorable throughout. Evidently, the shade eliminates the undesirable bright source, but in the case of the dark lining the contrast between the two parts of the visual field tends to bring out the edge of the shade too sharply, which attracts attention. The eye focuses on this edge quite close to the eye and then focuses back on the work, and that contraction and relaxation of the ciliary muscle produces fatigue. There is less contrast between the upper and lower portions of the visual field with the light lining, because the edge of the shade is not so pronounced and there is less of this muscular adjustment. A translucent shade would be presumably less favorable than this. If the shade is sufficiently dense to cut out the light source which attracts attention, it is subject to the difficulties accruing to the opaque shade with the dark lining.

These studies show quite clearly that indirect lighting is very favorable from the standpoint of ocular fatigue. On the other hand, it is more costly than the direct types. For certain kinds of work which require a fairly high intensity of illumination, particularly in rooms with dark or dirty walls, it would be unduly expensive to get enough indirect light on the work where it is needed. A common expedient in such cases is to supplement the indirect with some local lighting. If the local unit has an opaque shade over it so that the lamp itself is not visible to the worker, this system is quite satisfactory. It is important, however, that when the person looks around the room, there should not be too much contrast. An installation in which the intensity around the rest of the room is at least 10 per cent of the intensity on the work itself is satisfactory. This avoids undue contrast and also undue cost. The important thing to avoid is bright sources in the outer part of the visual field. If the room in general is quite dark, it is undesirable because a person gets dark-adapted as he looks around and then loses time in becoming light-adapted when he turns back to the work. When illumination is planned, it is important to consider not merely what is on the work itself, but the entire visual field and everything that the worker may see.

Visual acuity. There have been few investigations of distribution of illumination as affecting actual acuity or ability to see the work. The results appear, on the whole, negative. In one study of close visual work, with intensity constant, the differences in production between direct, semi-indirect, and indirect light were not more than 3 per cent.[13] However, the systems may vary with reference to the possibilities of undesirable glare. If the illumination comes strongly from one direction, there is a danger of some reflecting surface in the visual field producing a bright glare spot. In inspecting small brass parts, for example, production improved when indirect light was installed, partly as a result of eliminating glare.[14] Other things beside the distribution of the light contribute to glare. These include low sources such as wall brackets or low-hanging fixtures, glazed paper which reflects light, polished metallic objects, and a strictly local lighting unit with an opaque shade which produces a sharply defined circle of bright light.[15] Another possible source of glare is a floor painted a light color in order to reflect some light upward, for example, the factory floor underneath the wings of an airplane. If the floors are too light, glare may develop. It has been suggested that the eyes are more susceptible to glare from below than from above because the eye evolved with the individual in an upright position receiving, usually, greater brightness from the sky than from the rest of the landscape. There have been suggestions of using polaroid glasses in order to cut down undue sources of glare when the materials with which a person is working are of such a nature that reflection from the surface cannot be avoided entirely. Such glasses have been tried in at least one operation in soap manufacture. The actual discomfort of glare may be due partly to the changes of adaptation as one looks from a lighter to a darker area and, also, to a tendency to fixate alternately the bright source and the work.

---

[13] Anonymous, "The Effect of Different Systems of Lighting on Output and Accuracy in Fine Work," *Industrial Fatigue Research Board and the Illumination Research Committee, Joint Report,* London, 1928, page 9.

[14] Lester, A. W., "The Elimination of Glitter in an Industrial Lighting System," *Human Factor,* 1934, 8, 309–311.

[15] *Cf.* Tinker, M. A., "Illumination Standards for Effective and Comfortable Vision," *Journal of Consulting Psychology,* 1939, 3, 11–19.

Another aspect of distribution that may affect acuity deals with the possibility of shadows. For some types of work shadows are desirable. A completely indirect system caused difficulty in type-setting by hand because of the absence of shadows. The raised type and the metal base on which it is cast are very similar in brightness and practically indistinguishable. If, however, the light comes from one direction, the upright portion casts a shadow which is darker than the base. A similar result was found in some weaving operations, where shadows facilitate seeing the threads by making one side of the thread appear darker than the other.[16] Too much cross-lighting, however, produced glare.

Effect on attention. A further question regarding the distribution of illumination is whether it has any effect on the individual other than ocular. Some engineers have characterized indirect lighting as, "sleepy lighting." Monotonous sounds, for example, may have a mildly hypnotic effect. It is conceivable that monotonous illumination would do likewise. No experiments have been made bearing directly on indoor installations, but the results of one outdoor experiment are at least suggestive.[17] Two sections of street, meeting at a common square, were equipped for experimental purposes with a sub-station and facilities for varying the height, spacing, and intensity of the lights as well as the fixtures. Various studies of a photometric character were in progress, but some psychological experiments were made also. On a given evening, the two streets carried different equipment, and comparative results were obtained. Frequently, the principal variable was the distribution of the light. For example, one installation had small lights 14 feet above the curb staggered at 50-foot intervals, whereas the other had center lamps 24 feet above, at 150-foot intervals. The same total intensity was maintained, but in one case the street was lighted uniformly, whereas there were pronounced light and dark areas in the other. The general technique was to send the subject out to walk on a given street for fifteen minutes, at the end of which time the experimenter joined him with some portable apparatus. The most sensitive test was an auditory choice reaction with two bells as stimuli, the subject pressing either of two push buttons which he carried in his hands while walking along the street. Standard precautions were observed regarding practice and fatigue. Averaging together a considerable number of conditions in which one street was uniformly lighted and the other non-uniformly, the reaction time was 17 per cent faster for the non-uniform arrangement. This trend occurred with every pair of installations under investigation, and almost all the differences were significant. Other experimental techniques pointed in the same direction, although to a lesser degree. These results, to be sure, were not obtained with indoor installations. They did, however, bring out the point that there was something about uniformity that kept the person on a lower level of attention, whereas the variation of the illumination served to keep him more alert. This suggests that analogous mechanisms operate indoors. This tendency might offset some of the advantages of the indirect system mentioned earlier. However, conclusions should be withheld until further experimentation is done directly upon the problem.

---

[16] *Industrial Health Research Board, Seventeenth Annual Report,* 1937, page 7.

[17] Burtt, H. E., "The Effect of Uniform and Non-Uniform Illumination on Attention and Reaction Time with Special Reference to Street Illumination," *Journal of Experimental Psychology,* 1916, 1, 155–182.

There are experimental indications that intensity or brightness of light affects general alertness. The subjects sat at a table in a small room where the sole source of light was varied as to color and brightness. The subjects did auditory choice reactions, made certain sensory discriminations (not visual), performed tapping tests, and did mental arithmetic. There was a clear tendency for the reaction time to speed up as the brightness of the room increased. The other tasks showed the facilitating effect of brightness to a lesser degree. The underlying mechanism may be a dynamogenic effect (page 518). The tasks involved did not require vision, but the mere stimulation of the light reinforced the performance. Similar results were found in another case where the subjects did mental tasks while wearing goggles which sometimes were opaque and sometimes carried frosted glass. Performance was appreciably better under the latter conditions. Although no actual objects were visible, the light stimulating the eye did reinforce the mental performance.

The effect of the surroundings. Another aspect of distribution deals with the amount of illumination on the actual field with which a person is working as compared with the illumination of the surrounding area. A person inspecting dark cloth or rubber where the surroundings are several hundred times as bright as the material itself, may experience difficulty. Some of this is attributable to glare, but it also involves visual adaptation. If the eye is adapted to the bright surrounding area, it has difficulty in seeing the darker work adequately. An investigation of this point was carried out systematically by having the subjects look into a large, uniformly lighted box with a small test field at the far side. Two faint shadows appeared on this test field and either of them might disappear. The subject did a choice reaction by pressing keys corresponding to the stimuli. The ratio between the brightness of surroundings and field was varied, and the average reaction time determined at each ratio. The results showed quite clearly that when the ratio of surroundings to field was less than one or only slightly more than one, the reaction time was about .31 seconds; if, however, the surroundings were six times as bright as the field, the reaction was .33, which is appreciably slower, and when the surroundings were about nine times as bright as the field, the reaction time was .35.[18] In other words, when the surroundings were darker than the field or equal to it, no difficulty was encountered, but when the surroundings were distinctly brighter than the field on which the person was working, there was trouble. This suggests that it is inefficient in the working environment to have the work itself surrounded by something of a much higher level of brightness.

Mention should be made of the other type of adaptation in which a worker looks at one degree of brightness and then turns to the work which is of a different degree. A typical situation would be facing a window where one may look outdoors at a bright sky, become light-adapted, and then look back at the much darker work. Another instance would be looking at bright things on the work bench and then going underneath the bench to make adjustments in the machinery. Accidents sometimes result from this situation.

Quality of Illumination

Color and acuity. A third illumination variable that has possible bearings on industrial efficiency is its quality. Daylight is a combination of all the color wave lengths, whereas artificial light usually involves a limited portion of the spectrum. The conventional tungsten lamp is somewhat toward the reddish end. Some types of illumination are designed to use a very narrow portion of the spectrum. The mercury arc is predominately greenish, and the sodium lamp mainly yellow—they are monochromatic. One possible advantage is that they give sharper detail in the object illuminated because they minimize chromatic aberration, which means that the different wave lengths are refracted slightly differently in going through the lens of the eye or through a prism. The rainbow results when sunlight shines through a prism because the red wave lengths in the white light are not bent as much in going through the prism as are the violet, with the others intermediate. Therefore, if one is looking at an object illuminated by white light, the red components will not be refracted quite as much in going through the lens of the eye and will tend to focus behind the retina, whereas the violet components will be refracted more and will tend to focus in front of the retina. The net result is that the object is slightly blurred. With monochromatic light from only a narrow range of the spectrum, everything focuses at about the same point. Hence, in industrial situations where fine discrimination of detail is necessary, monochromatic light should produce a sharper retinal image. This has been used as a selling point for mercury vapor lamps and there is some empirical evidence in support of it. A study was made of production in inspection work with tungsten lamps, with daylight, and with mercury vapor lamps. In all cases production rose rapidly with increasing illumination up to about 10 foot-candles and then began to level off. However, the point at which it leveled off for tungsten was about 98 production units, for daylight, 101, and for mercury vapor 107, with a very gradual increase up to 109 at 50 foot-candles.[19] Laboratory studies on this point are somewhat equivocal: some reveal no difference in acuity under mercury vapor as compared with other lamps, and others indicate an apparently greater "distinctness" under the mercury vapor. This last point deals with what the subject thinks he can do rather than with his actual visual proficiency.[20] None of the studies show any thing unfavorable regarding the monochromatic illumination. There were indications in one plant, however, that there was a difference in attitude toward the light according to sex. The women disliked the mercury vapor installation because it made them look ghastly and the green light killed their red make-up.

---

[18] Johnson, H. M., "Reaction to Visual Stimuli as Affected by Distribution of Brightness of the Visual Field," *Journal of Experimental Psychology,* 1924, 7, 1–44.

A preliminary investigation with sodium vapor illumination indicated that acuity with very fine discrimination was somewhat increased under the sodium lamp, but no advantage for the sodium lamp was detected with larger objects. If this point is borne out by further research, the implication would be that sodium lamps might be useful for close inspection work, but otherwise would have no particular benefit.

---

[19] Ford, A., *A Scientific Approach to Labor Problems*, page 151. New York: McGraw-Hill, 1931.

[20] *Cf.* Tinker, M. A., "Illumination Standards for Effective and Comfortable Vision," *Journal of Consulting Psychology*, 1939, 3, 11–20.

Color and attention level. The question is sometimes raised as to whether colored illumination such as red windows in the factory would stimulate the workers to greater efficiency. Experiments on this problem are very few. In one experiment the subject sat in a room with dead black walls at a table covered with neutral gray blotting paper. Above the table was a lighting unit with colored filters which suffused the room so that the subject's entire environment was a highly saturated red, or green, or blue. The intensity was kept constant, of course, when any comparison of the effect of the different colors was made. Under these conditions the subject performed certain tasks which did not require visual discrimination—because the effect of color on acuity might have complicated the results. The tests included tapping at a comfortable rate, estimating pressures kinesthetically, judging pleasantness of touch substances, mental multiplication, giving associations to stimulus words, memorizing nonsense syllables, and a continuous choice reaction to auditory stimuli. The results were essentially negative except for the choice reaction which showed a slight retardation on the blue, whereas red and green were about alike.[21] It appears either that the effect of color on general attention level or its dynamogenic effect is too slight to be of any industrial significance, or else that the techniques used were not sensitive enough to reveal the effect. It is probable that the former alternative is the correct one. It will be recalled, however, that this same kind of experiment indicated that brightness had a stimulating effect.

Mention should be made of one study dealing with the colors of machines and tools.[22] It is claimed that the proper combinations of color and brightness of the machine parts improved accuracy of perception and increased production and ocular comfort. Where a high degree of attention was necessary, it seemed better to have the tools whiter than the background. It is not clear whether this result was related to attention and alertness, which is under discussion, or whether it was more a matter of brightness contrast and visibility.

Fluorescent lighting. Little psychological experimental work has been done with fluorescent lighting. This type of lighting has certain advantages from an engineering standpoint. On the basis of principles established with other types, some points are highly probable. Fluorescent lighting is quite diffused, and other diffused systems were found to be favorable from the standpoint of ocular fatigue. The practical problem, presumably, is the location of the fluorescent unit. Here an important consideration is the presence or absence of bright sources in the margin of the worker's visual field. It will be recalled that when several direct lighting units were visible, those bright spots attracted attention and caused focusing of the lens back and forth between the light source and the work. A fluorescent unit may be located in such a way that there would be a distinctly bright spot, either the tube or the inside of the reflector, within the range of vision. In that case, it would be unfavorable for the reasons mentioned above. If, however, the bright source is invisible, the uniform character of the illumination might be favorable. With the proper installation, this probably would be an effective type of illumination.

---

[21] Pressey, S. L., "The Influence of Color upon Mental and Motor Efficiency," *American Journal of Psychology,* 1921, 22, 326–356.

[22] Brainard, A. A. and Denning, M., "Improved Vision in Machine School Operation by Color Contrast," *Illuminating Engineering,* New York, 1941, 1936, 1397–1413.

Ventilation—Laboratory Investigations

Variables involved in comfort. Ventilation is another environmental aspect that may have a bearing on industrial efficiency. Its relation to comfort is clear enough, but its actual effect on efficiency is less obvious. It is well to note at the outset just what variables in ventilation are the effective ones. This has been checked empirically in the laboratory. The subjects sat in a room where no fresh air was introduced and, of course, oxygen decreased and carbon dioxide increased. The subjects showed evidence of discomfort, and the situation was relieved quite a bit by circulating the air with an electric fan although no fresh air was introduced. Then the subjects wore masks by means of which they breathed fresh air from outside the chamber through a tube but no relief resulted. They still felt uncomfortable, although their lungs were receiving good air. On the other hand, persons sitting outside the experimental chamber in normal ventilation but breathing the bad air from the chamber through a similar tube and mask felt comfortable enough. In other words, it was what impinged on the surface of the body, rather than what went into the lungs that constituted the principle factor in comfort. The explanation centers around the mechanism which regulates body temperature. Normally, this temperature is about 98.6 degrees Fahrenheit. If a person who is in good health does enough physical work to raise this bodily temperature, he perspires, and the evaporation of the perspiration has a cooling effect which tends to keep his temperature normal. If the room temperature increases excessively, sufficient radiation of body heat cannot occur. Moreover, if the humidity increases markedly, it is impossible for evaporation of perspiration to take place. That is one reason that it is so uncomfortable in the humid days in August, even though the temperature may be no higher than it is in July. Circulating the air increases evaporation somewhat. Thus, in artificially controlling ventilation in the interest of efficiency, it is the variables of temperature, humidity, and air-circulation which are paramount.

Mental work. Laboratory investigations have been made of the effect of ventilation on mental efficiency.[23] The subjects performed mental tests under various conditions of ventilation, ranging from 68 degrees and 50 per cent humidity with fresh air introduced, up to 86 degrees, 80 per cent humidity, and no fresh air. Fans were used in some series. The differences in test performance under the various installations were surprisingly small. Considering the two extreme ventilating conditions, the average scores in a color naming test were identical at 49, an opposites test had an average of 53 under the good and 55 under the bad conditions. Corresponding averages for a cancellation test were 101 and 102 under the two extremes, and there were differences of only a couple of points for addition and multiplication. On the other hand, the estimates of comfort made by the subjects on a five-point scale ranging from "I feel as comfortable as I ever do" down to "I feel as uncomfortable as I would with a severe headache," averaged 3.6 under the best conditions and 2.5 under the worst. The test results obviously did not correspond to the comfort estimates. Similar results were found in an investigation of the rate of improvement in various tests extending over two weeks—one week under favorable and the other under unfavorable conditions. The transition from one setting to the other made no appreciable changes in the learning curves. This suggests that motivation was an important factor and that if the subjects wanted to exert themselves, they were just as able to do mental tasks under the poor ventilation conditions as otherwise. Subjects in laboratory experiments usually are better motivated than workers under industrial or office conditions. The conclusion is that as far as mental work is concerned, a person is less *willing* to work under hot and humid conditions but not less *able* to work. What usually happens is that under the disagreeable conditions he compensates for the discomfort or the disagreeableness by slowing down so that he actually gets fewer units of discomfort per unit of time.

Physical work. It is a somewhat different story with physical work. As part of the investigation just cited, the subjects lifted a five-pound dumb-bell periodically to a distance of two and a half feet. The foot-pounds of work per hour were computed for each subject. Under conditions of 86 degrees and 80 per cent relative humidity, the average subject accomplished 28 per cent less total work in a day than at 68 degrees and 50 per cent humidity. Afternoon production was less than morning under all conditions, but whereas, under favorable ventilation, the afternoon dropped off about 30 to 32 per cent, with warm air (in this case the humidity was not varied) the drop was 36 to 38 per cent. Evidently, the ventilation interfered with the elimination of excess bodily heat during the physical work and militated against the continuance of that work at a high level of efficiency.

---

[23] *Report of the New York State Commission on Ventilation,* New York: Dutton, 1923.

Ventilation and Industrial Efficiency

The conclusions from laboratory studies are borne out in actual practice. There are various reports on industries that installed improved ventilation and found a corresponding increase in production. In a photographic manufacturing concern a 4 per cent increase in output and a 50 per cent decrease in illness occurred under these circumstances.[24] In a weaving operation a loss in efficiency of about 1 per cent resulted for every degree rise in wet-bulb temperature.[25] This is found by a thermometer with a moist wick around the bulb. As the water in the wick evaporates, it cools the bulb so that the thermometer registers lower than it otherwise would. There is less evaporation with increased humidity in the atmosphere, and the wet-bulb registers more nearly what it would without the wick. This thermometer in conjunction with an ordinary one constitutes a standard method for measuring relative humidity.

Coal mines. Significant data may be obtained in mines by the simple expedient of going deeper where there are conditions of greater discomfort due to the increased temperature. In some cases the same type of operation is performed at these various levels. One study of coal mining[26] of which the results are summarized in Table 33 may be cited. The Kata cooling power mentioned in the first column is an index based on the wet-bulb thermometer (sometimes called a Kata-thermometer) and the air velocity. As the index descends the column conditions that are less and less comfortable as they permit less heat to radiate from the body are indicated. The production of coal is indicated as a percentage of the production at the most favorable level. The correspondence between the two columns is quite clear. There is a consistent trend for production to decrease as the cooling power of the atmosphere decreases. Similarly, in a gold mine, when wet-bulb temperature dropped from 89 to 80 degrees because of artificial cooling, production increased 12 per cent.

---

[24] See McConnell, W. J., "Effect of Air-Conditioning," *Personnel Journal,* 1935, 14, 303–306.

[25] Weston, H. C., "An Investigation into the Linen Weaving Industry," *Industrial Fatigue Research Board, Report No. 20,* 1921.

[26] Vernon, H. M. and Bedford, T., "The Relation of Atmospheric Conditions to the Working Capacity and the Accident Rate of Coal Miners," *Industrial Fatigue Research Board, Report No. 39,* 1927.

TABLE 33

Atmospheric Conditions and Efficiency in Coal Mining *

Kata Cooling Power	*Rate of Production*
18.6	100
14.6	94
12.9	91
10.8	82
9.0	81
6.4	59

* Vernon and Bedford

Seasonal fluctuations. Further information on the same point may be obtained in industries where a record of production throughout the year is available. There usually is a drop in production during the summer, presumably because of atmospheric conditions. In tin plate manufacture this summer-time drop in factories with no artificial ventilation and very poor natural ventilation amounted to 13 per cent. Other tin plate manufacturing establishments that had good artificial ventilation experienced only a 3 per cent production drop during the summer.[27]

Accidents. Accidents provide another indication of inefficiency and may be scrutinized with reference to ventilation. There have been instances where accidents rose to a peak in midsummer corresponding to the summer decreases in production mentioned above. In munitions plants in England during the first war a minimum number of accidents occurred between temperatures of 65 and 69 degrees (dry-bulb). On both sides of that region the accidents increased appreciably. At 75 degrees there were something like 23 per cent more accidents than at the favorable minimum. In the other direction, at 57 degrees, the increase was 16 per cent. In a coal mine there were 50 per cent more accidents over a six-year period in the deepest seam than in the shallowest seam where the temperature was 50 degrees lower.[28] In a machine shop a record was made of the temperature at the time of each accident that necessitated any medical treatment. The lowest rate here, likewise, was between temperatures of 65 and 69 degrees. At 75 degrees or more accidents increased 30 per cent, whereas at 59 degrees or less, the increase was 8 per cent.[29] The increase at the high temperatures doubtless reflects the distracting effect of the discomfort. There is also the possibility that perspiration would make the hands slip when grasping tools. At the low temperatures one factor is stiffness of the hands and resulting poor coordination.

---

[27] Vernon, H. M., "The Influence of Hours of Work and of Ventilation on Output in Tin Plate Manufacture," *Industrial Fatigue Research Board, Report No. 1,* 1919.

Over-all conclusions. The upshot of these various investigations is that in muscular work provision for the dissipation of the heat generated is highly desirable if production is to be maintained at a favorable level. With mental work it is theoretically possible with adequate motivation to continue effectively even under unfavorable ventilating conditions. However, in actual practice this adequate motivation is not present. When a worker feels uncomfortable, he compensates by slowing down. In emergencies, however, it would be possible to continue mental work with minimal loss of efficiency much better than physical work.

Noise as a Distraction

Modern industry and offices have a great deal of noise and the question arises whether this has any unfavorable effect on the worker. Almost everyone has found himself unable to concentrate in the face of an unusual noise. On the other hand, some people like to study or do light reading with the radio on. There is a possibility of becoming adapted to a sound. One does not notice the clock ticking. Persons living on a noisy street are able to sleep, and soldiers, on occasion, have slept through artillery fire. The problem is complicated.

General experiments. It is obvious that noise, if sufficiently intense, introduces a serious distraction. The conventional experiment has subjects go through a series of visual reaction times or do some arithmetic, first in a quiet setting and then with attendant auditory distraction. Typical results are slower reaction time and poorer arithmetical performance under distraction. Similar results are found with a motor as contrasted with a mental task. Noise reduced efficiency in putting pegs in holes on a moving belt, although not quite so much as in the mental tasks involved in the same experiment. The interference was greater if the noise had some rhythmical component which did not synchronize with the task.[30]

---

[28] Osborne, E. E. and Vernon, H. M., "The Effect of Temperature and Other Conditions on the Frequency of Industrial Accidents," *Industrial Fatigue Research Board, Report No. 19*, 1922.

[29] Husband, R. W., *Applied Psychology*, page 291. New York: Harper's, 1934.

Compensation. Some of these experiments reveal another factor, namely, that the individual tends to compensate for the distraction by additional effort. In performing the average task, a person does not use every last bit of available energy. This is as it should be—otherwise people would be exhausted much of the time. However, this reserve is available and can be tapped in an emergency. A man is lost in the woods and completely exhausted after wandering around for hours, but he is frightened by a supposedly wild animal and runs half a mile. Persons who are distracted by a noise and otherwise might be less efficient make a little extra effort and rise to the occasion. Interestingly enough, they sometimes make a little more than the amount of effort necessary to rise to the occasion and actually do better with the distraction than without. This is called overcompensation and has been demonstrated many times experimentally. It will be shown presently that it nevertheless costs more from the metabolic standpoint so that the deliberate use of distractions to produce overcompensation would be inadvisable. Another factor that may influence the results is adaptation. In one experiment subjects added long series of three-place numbers with and without noise provided by phonograph records of actual office or street sounds at intensities of 55 to 65 decibels. At the outset there was some decrease in accuracy and in number of problems solved, per unit of time, but after a few weeks, during which the subjects spent twenty minutes a day in the experiment, the effect of noise gradually disappeared.[31]

Something depends on the subject's attitude toward the situation. There is quite an element of suggestion or set. In one study where subjects performed addition problems under quiet and noisy conditions, some groups were told that the distraction would retard their work, others that it would speed the work, others that it would have an initial retarding effect but later would facilitate the work, and still others received no such instructions at all. Some spurious charts were shown to reinforce the suggestions. The results varied, as might be expected, in the light of the instructions. Those who expected to do better under the distraction actually did so and *vice versa*. This is the well-known effect of suggestion.[32] It is obvious that the rate of performance in a test is none too stable and subject to casual influences of this sort. An interesting finding, which, however, needs corroboration, was that in doing a decoding type of test, introverts were more disturbed by noise than were extroverts.[33]

---

[30] Pollock, K. G. and Bartlett, F. C., "Psychological Experiments on the Effect of Noise," *Industrial Health Research Board, Report No. 65,* 1932.

[31] Harmon, F. L., "The Effect of Noise upon Certain Psychological and Physiological Processes," *Archives of Psychology,* 1933, No. 147.

[32] Baker, K. H., "Pre-Experimental Set in Distraction Experiments," *Journal of General Psychology,* 1937, 16, 471–488.

Metabolic effect. Although there is a possibility that noise will produce overcompensation rather than an actual lowering of performance, the question arises whether it has any ulterior effect on the individual. One method of checking on this is to measure basal metabolism during the experiment. This technique (page 514) collects expired air which is then analyzed to indicate the calories consumed during a given period of time. A record is taken when the subject is doing nothing, when he is working without distraction, and finally, when he is working with distraction. The increase of metabolism when the person is working over that when he is doing nothing is the index usually noted, and differences in such indices for quiet and noisy conditions may be determined. A difference of 5 per cent was obtained when the subjects were doing arithmetic problems.[34] A record of metabolism of four typists copying letters at top speed was secured every fifteen minutes for two-hour stretches. The four of them averaged a slight superiority in speed, 3 per cent, under the quiet conditions compared with the noisy. However, with reference to the metabolism, under the quiet conditions they averaged 51 per cent more calories when typing than when doing nothing but under the noisy condition they averaged 71 per cent more calories than when sitting quietly. This increased metabolic cost is about 20 per cent.[35] Expressing it in another way, the noise produced comparatively little change in output, but required a considerably greater input.

Noise and tension. There are other indications of this greater input. Subjects translated letters into numbers according to a code, with and without various distracting noises such as a buzzer, a bell, or a phonograph. The pressure exerted on the mechanisms used in making their responses was a matter of record and could be analyzed throughout the period. The actual performance in translations also was noted. Production required appreciably more time at the outset of each period when the noise was introduced, but there were clear indications of adaptation to it, so that by the end of forty reactions the necessary time was down to approximately the level of the quiet series. The pressure exerted with the fingers, however, was considerably greater at the outset of the noise period. There was some subsequent decrease in tension, but throughout the noisy period the tension remained clearly above the average for the quiet period.[36]

---

[33] Vergius, R., "Die Ablenkung von der Arbeit durch Larm und Musik und Ihre Strucktur-typologischen Zusammenhange," *Zeitschrift für Arbeitspsychologie,* 1939, 12, 90–114.

[34] Vernon, H. M. and Warner, C. G., "Objective and Subjective Tests for Noise," *Personnel Journal,* 1932, 11, 141–149.

[35] Laird, D. A., "Experiments on the Physical Cost of Noise," *Journal of the National Institute of Industrial Psychology,* 1929, 4, 251–258.

A similar trend was found with muscle potentials recorded by means of electrodes on the forearm and appropriate apparatus. The subjects did no work but sat passively during quiet or noisy periods of two minutes each. Each time the noise began there was a sharp increase in muscle potential which, however, dropped off again quickly. As the experiment continued, these peaks were not as high but still were present. The noise evidently produced a general muscular tension to which there was rapid but not complete adaptation. This ties in with the fact that intermittent noises are more distracting than steady noises.[37]

Analysis of the noise. One investigation may be cited which varied the type of noise and noted the effect on efficiency.[38] The subjects performed a modified dotting test in which they made contacts with a stylus through holes in a moving tape. The holes varied in size and location, and the results were recorded electrically. The task was somewhat analogous to a simple assembly operation with a conveyor belt. Illumination and ventilation were maintained constant. The subjects worked for periods of four and a half hours and were paid by the hour. Two workers sat in a room together and performed tasks simultaneously, and after every 500 holes there was a two-minute rest, and the workers were told which of the two had done better. The noise was produced by an audiometer calibrated to furnish known intensities. The production score consisted of errors—that is the number of holes missed per unit of time. The results of most interest are shown graphically in Figure 18. In the portion at the left the abscissa gives the intensity of the sound in decibels, and the ordinate gives the number of errors in the task. The decibel is a standard unit of sound intensity. It actually represents the logarithm of the ratio between the air pressures of sound waves for two different sounds. For practical purposes, it is roughly equivalent to the just noticeable difference in sound intensity—the difference-threshold. A rough notion of the scale may be obtained from the following approximate decibel equivalent of some familiar conditions:

---

[36] Morgan, J. J. B., "The Overcoming of Distraction and Other Resistances," *Archives of Psychology,* 1916, No. 35.

[37] Davis, R. C., "The Musculai Tension Reflex and Two of Its Modifying Conditions." *Indiana University Public Science Service,* 1935, No. 3.

[38] Laird, D. A., "The Influence of Noise on Production and Fatigue as Related to Pitch, Sensation Level and Steadiness of the Tone," *Journal of Applied Psychology,* 1933, 17, 320–330.

10	One's own heart beat
20	Underground vault
30	Quiet farmhouse
40	Average residence
50	Average quiet office
60	Average general office
70	Average stenographic room
80	Tabulating machine room
90	Average automobile horn
100	Subway car
110	Airplane cabin
120	Artillery fire
130	Painful sound

In the present study the range was from 40 to 90 decibels. The curve in the left portion of the figure indicates clearly that as the intensity of the distraction increases, the errors in the task increase likewise. Moreover, they do not increase directly in proportion, but by acceleration—for instance, doubling the intensity more than doubles the errors.

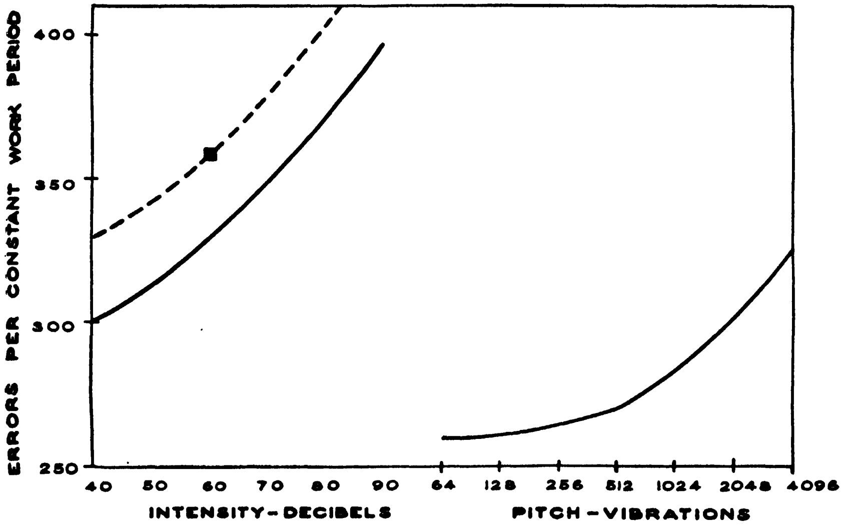


Figure 18. Effect of Intensity, Steadiness, and Pitch of Noise on Efficiency of Work.

In this same investigation the noise was varied in intensity from 50 to 70 decibels and back again in cycles of eight seconds. This gave an average of 60 decibels. The average error under those conditions is indicated by the heavy square on the ordinate at 60 decibels and is comparable with the main curve at that same ordinate. The investigator hazards the assumption that if data had been obtained for an intermittent noise at different parts of the intensity range, a curve would be obtained like the dotted line shown in the figure. Even the single point on the curve yields considerable presumption that an intermittent noise is more distracting than a steady one. A third aspect of the experiment dealt with the pitch of the tone. The intensity was kept constant, but the pitch ranged from 64 to 4,076 vibrations. The curve in the right portion of Figure 18 shows that with tones up to 512 vibrations, which is an octave above middle *C,* there is no appreciable difference in performance on the task, but as the pitch increases beyond that point, there is a very definite and practically linear increase in the errors. Apparently the higher pitches are more insistent from the standpoint of distraction.

Noise in Industry

Noise reduction. Techniques for noise reduction lie in the field of engineering. Much of the noise which exists under industrial or office conditions is reflected from the walls and ceiling. The noise which comes directly from the machine to the ear of the worker is only a modest proportion of the total impact. It can be demonstrated physically that in a room with smooth walls which reflect readily, a given sound may be reflected 500 times before it gets below the level where it can be detected by appropriate instruments. These reflections may require several seconds, so that at any instant a listener is getting an accumulation of reflections from many previous stimuli. The obvious solution is to put materials on the walls and ceiling with lower reflection coefficients. These materials are porous so that a sound wave often gets into a little hole and never gets out. An installation that absorbs about 50 per cent of the sound would reduce those 500 reflections to 87.

Empirical results of sound treatment. Many industrial organizations have installed sound treatment in the interest of increasing efficiency. A few reports on the results of such treatment may be cited as typical. A 42 per cent reduction of errors in a telegraph office resulted from soundproofing the walls. Errors were reduced 24 per cent in a bookkeeping department. Lowering the noise level in a telephone exchange from 50 to 35 decibels reduced errors 42 per cent and reduced the cost per message 3 per cent. An increase of 12 per cent in output in an insurance office was brought about by reduction of the noise level from 45 to 35 decibels.[39]

Similar results are found with heavier types of work. In the weaving department of a textile plant noise was reduced from 96 to 81 decibels, and production increased about 3 per cent.[40] A group of workers were assembling temperature regulators in a room adjacent to a boiler shop with its proverbial noise and were producing about sixty imperfections in every lot of 80 regulators. They were moved to a more quiet place and did 110 in the same length of time formerly required for 80, with only seven imperfections. In another room poor production in packing materials was suspected to be due to the noise of a fan. When the fan was stopped, production immediately jumped 12 per cent, in spite of the poorer ventilation.[41]

---

[39] Anonymous, "Effect of Noise on Efficiency," *Monthly Labor Review,* 1930, 30, 1199–1208.

A large insurance company was planning a new office building and was concerned about the advisability of sound treatment. They were making their plans far enough ahead to do some investigation. They obtained records of production and then treated the walls with soundproofing materials as inconspicuously as possible so that the workers would not be aware that they were being experimented upon. Records were obtained extending over several months under the new conditions and, as a final check, the plaster was put back on the walls again to see if the production would revert to its original level. In typing, the speed was increased about 10 per cent and the errors decreased 30 per cent with the sound treatment. Then, when the plaster was resumed, the speed dropped back 8 per cent, and the accuracy went all the way back. Somewhat similar results were found with comptometer operators, checkers, and punch-card operators.[42] A possible reason why performance did not revert completely to the original level was that there was a reduction in work at this time and some of the less efficient employees were laid off. The company was sufficiently convinced of the value of this sound treatment to spend half a million dollars in their new building for that purpose alone.

Music in Industry

A final environmental factor that may influence industrial efficiency is music. Many persons turn on the radio when they are working at home. There is the classical instance of the cigar workers in Florida where phonograph records were played experimentally, and the effect upon production was favorable. A concern that played music over a public address system for test purposes accidentally hit upon the fact that the workers liked the music. It will be beneficial to look into this question a little more systematically to find out if music has a favorable effect on production and on workers' attitudes.

---

[40] Weston, H. C. and Adams, S., "The Performance of Weavers Under Varying Conditions of Noise," *Industrial Health Research Board, Report No. 70,* 1935.

[41] Anonymous, *Industrial Psychology,* 1928, 3, 323.

[42] Griswold, P. B., "Measuring Cost of Noise in an Office," *Less Noise and Better Hearing,* 1930, 2, No. 7, 4.

General results on production. Comparatively few systematic studies of music and production have been made, although much has been written on the basis of general observations. One study[43] was conducted in the radio tube manufacturing plant just mentioned. The study provided different kinds of musical programs for the plant and recorded scrappage as an indication of efficiency of work. After an initial period with no music, two weeks were devoted to music selected at random, which is termed a "check" series. Three weeks followed with slow music, then three weeks of fast tempo music, then three weeks of "arranged" programs (starting with familiar and ending with less familiar), and finally, there was to be a period with no music. An interesting by-product of the experiment was that when it reached the final period of no music at all, the workers protested so vigorously that management found it necessary to discontinue the experiment at that point. In all periods except the check period, the schedule was as follows: one week with a selection played every half hour, a second week with two selections played consecutively every hour, and a third week with three selections played consecutively every hour. Data were available for three separate departments making three different types of tubes. The results are summarized in Table 34.

TABLE 34

Music and Production *

	Dept. A	*Dept. B*	*Dept. Z*
Check—No music	*N* 2.1	*N* 1.2	*Ck.* 7.9
Arranged—No music	*N* .7	*Ar.* 7.3	*Ar.* 2.6
Fast—No music	*F* 2.1	*F* 18.5	*F* 4.7
Slow—No music	*S* 4.4	*S* 10.4	*S* 6.9
Slow—Check	*S* 5.9	*S* 8.3	*Ck.* .3
Slow—Arranged	*S* 4.7	*S* 1.8	*S* 4.7
Slow—Fast ...	*S* 2.0	*F* 2.9	*S* 1.3
Check—Arranged	*Ar.* 1.3	*Ar.* 6.3	*Ck.* 5.5
Check—Fast	*F* 3.8	*F* 12.2	*Ck.* 1.7
Arranged—Fast	*F* 2.6	*F* 4.8	*F* 2.6

* Humes

In the upper portion the column at the left indicates the two situations under comparison—for example, the period with the check music and with no music. For any comparison the hourly average per cent scrappage was compared for the two systems, and the critical ratio computed.

---

[43] Humes, J. F., "The Effect of Occupational Music in the Manufacture of Radio Tubes," *Journal of Applied Psychology*, 1941, 25, 573–587.

It is these critical ratios that appear in the body of the table. The abbreviation preceding each ratio indicates which of the two conditions appearing at the left of the row yields better results, that is, less scrappage. It will be recalled that if the critical ratio (the difference divided by its standard deviation) is 3 or more, it is almost certain that the difference is significant and represents a real trend, not just something accidental. For example, in the first row of the table the check series is compared with the period of no music. In department *A* no music is superior with the critical ratio of 2.1, in department *B* no music is also superior but the ratio is only 1.2, and in department *Z* the check series is superior from the standpoint of scrappage with a critical ratio of 7.9. Only the last of these cases is significant, so that what trend there is favors the musical situation. The arranged program is significantly superior to no music in one department and probably two, the fast music is better than none in two departments, and the slow music is clearly superior in all three. Out of the twelve comparisons, seven are clearly of statistical significance, and one at least very close to it. The remainder of the table will be discussed later. The over-all trend in favor of music is fairly clear.

Another investigator reports on a number of industrial studies, although the industry and the exact type of work are not specified.[44] Production per hundred man hours for a hundred employees of varied experience during two typical weeks was recorded with and without music installation. Without the music the average production was 301, and with the music, 336—a difference of 11 per cent. In the period without the music there were more fluctuations during the week, with production starting low on Monday, dropping still farther on Tuesday, rising to a peak on Wednesday, and then tapering off toward the end of the week. With the music the first three days were uniformly high, with a gradual decrease toward the end of the week. Another similar tabulation includes the production for eight weeks following the installation of music. In only one of these weeks was production lower than in the control period before the music was installed. The results in the last five weeks were much more marked than in the first three. The over-all increase for the complete period was something over 30 per cent. Phonograph music, mostly dance music with a little semi-classical occasionally, was employed in a British firecracker factory. Results are presented on the production of twelve workers.[45] The experiment began by noting production for six weeks under usual conditions with no music. There were marked fluctuations from day to day, but the average was about 90 units of production through this six-week series. For the next three weeks miscellaneous dance music was played from 10 to 11:15 A.M. and from 4:00 to 5:00. Here, the production jumped appreciably to about 95 units. In the next three-week series the music occurred from 9:30 to 10:00, 11:00 to 11:45, and 4:00 to 5:00. Production dropped a little but not back to the original level. In the next series there were five musical periods during the day, four of them lasting half an hour with the afternoon period an hour. Production picked up again to around 95 units. In the final series with no music the initial production was about 95 units, but dropped gradually during the five weeks to the original level of about 90. The over-all conclusion was a favorable effect of the music ranging from 3 to 6 per cent.

---

[44] Burris-Meyer, H., "Music in Industry," *Mechanical Engineering*, January, 1943, pages 31–34.

[45] Wyatt, S. and Langdon, J. N., "Fatigue and Boredom in Repetitive Work," *Industrial Health Research Board, Report No. 77*, 1937, pages 30 ff.

A systematic investigation was made with two shifts of twenty-one girls each assembling radio equipment. A schedule was arranged in which there were one, two, three, four, or five hours of music during an eight-hour shift, staggered systematically on different days. Instead of having, as in the other experiments cited above, a period of weeks with music and then a period without any music this experiment had days in the same week with and without music. This eliminated possible errors due to long-time trends. The music was always distributed uniformly through the shift by having a period of it at the beginning of each hour. Records of production were used to determine the effect of the music and were corrected for weekly and long-time trends of production.

For the night shift every week all the arrangements yielded greater production with the music. The over-all difference for all the systems on the night shift was 17 per cent. The two-hour and the four-hour arrangements and also the total of all arrangements gave differences which were significant at the 1 per cent level.[46] In the day shift the over-all difference was only 7 per cent, and it was significant only at the 3 per cent level. Only the one-hour arrangement was significantly superior to no music at the 2 per cent level. Obviously the results were not as striking in the daytime. A possible reason was that the music was not loud enough to overcome the attendant noise for many of the workers.[47]

One other bit of evidence dealt, not with actual production, but something also important—absences. Monday morning absenteeism in four weeks before the music was introduced averaged 22.7, whereas in the four weeks after the music, the Monday morning absences were 2.8, a drop of about 87 per cent.[48]

---

[46] This is a little different formulation of the type of interpretation involved in the critical ratio that has been used elsewhere in the discussion. In the present instance it means simply that chances are not over 1 in 100 that the difference is purely accidental.

[47] Smith, H. C., "Music in Relation to Employee Attitude to Piece Work Production and Industrial Accidents," *Applied Psychology Monographs,* 1947, No. 14.

Subjective results. Surveys have been made of management on their opinion of music. The results are quite favorable. A survey of employers in England showed that 74 per cent of those who used music believed it did increase efficiency. In a survey of war plants in 1943 of those that had public address systems and used music, 87 per cent said that the music improved morale, and 57 per cent said that it improved production. A third of them, however, had no music during work hours; although almost all of them had it at lunch.[49] Then there are studies in which workers themselves are asked about the use of music. Favorable responses often are obtained. They think the music improves their feelings toward their associates, makes them feel less tired, soothes their nerves, aids digestion, helps in performing a monotonous task and in forgetting their worries. In one instance the ratings were higher for the night shift than for the day shift, possibly reflecting the greater monotony and fewer outside interests in the night shift. Questionnaires like this, however, must be discounted somewhat. It is much like asking the grocer if the eggs are fresh. There is a certain element of suggestion involved and something of the halo effect (page 129) because, if workers have a favorable impression in general regarding the music, they are apt to rate it highly on all its effects. Another study which is open to the same objection did not ask workers directly what they thought about music but played the music and had them rate themselves for tiredness and unpleasantness on a five-point scale during the period. Effort was made to reduce suggestion somewhat by interspersing announcements such as weather reports during part of the experiment. Almost all the differences favored music rather than no music from the standpoint of minimizing tiredness and unpleasantness.[50]

Type of music. Granted that music does have an over-all favorable effect, the question arises whether certain types are better than others in particular situations or even in general. There are some things that are fairly obvious. For example, a radio program with a good deal of conversation and chatter causes too much distraction, whereas music alone can remain in the background. Photographs taken of workers showed that when conversation was involved, they actually looked up at the

[48] Burris-Meyer, "Music in Industry."

[49] Beckett, W., *Music in War Plants.* War Production Board, 1943, page 60.

[50] Middleton, W. C. and Fay, T. J., "The Effect of Music on Feelings of Restfulness, Tiredness and Pleasantness, Unpleasantness," *Journal of Psychology,* 1944, 17, 299–318.

source of the sound, whereas when music was played, the workers looked at their work. There are some specific selections which are out—songs in which the audience has to clap their hands on the chorus. Dropping one's tools for this purpose would scarcely be warranted.

The results of a study of employees assembling radio equipment[51] were analyzed according to the type of music. For example, marches and waltzes were alternated in the opening period of each hour. Production was 4 per cent higher for waltzes in the day and 2 per cent in the night, but the differences were not statistically significant. The results were also equivocal when 0, 50, or 100 per cent classical music or 0, 50, or 100 per cent vocal music was used. As far as this experiment was concerned, nothing definite was revealed as to the best kind of music, although music's general effectiveness was established.

In the British study referred to above some analysis was made of the different kinds of musical programs. Light music of the semi-classical type was inferior to one-step or fox-trot music and did not differ significantly from waltzes or marches from the standpoint of attendant production. The two best types in this investigation were one-steps and fox trots. The differences were significant from the statistical standpoint, but, of course, involved only the dozen workers in a single plant. The other experiment cited earlier has some data on this same point, and the results are somewhat equivocal. The lower portion of Table 34 makes comparisons between the four types of music involved in the experiment. No clear-cut tendency is obvious. The slow music is better than the check series in two out of three, better than the arranged in two out of three, but equivocal with reference to fast music. With check and arranged, one series contradicts the other. Fast is better than check in two thirds of the cases and superior to arranged in one case. Nothing very clear stands out from this analysis except possibly the inferiority of the check, which was a random arrangement. Having the music all distinctly fast or slow, or starting with familiar and leading up to unfamiliar, all seemed slightly better. It would be difficult to pick out a universal, ideal program from available data. Naturally, employees have been asked what they preferred and considerable variety is discovered. In one instance they requested popular hit-parade songs, patriotic, Hawaiian, waltzes, polka, and square-dance, marches, fast dances, sacred, semi-classical, hillbilly and western, in that order. Some expressed a preference for male voices on the chorus, some said they did not like organ music, others tabooed hymns. No very clear trend is found in expressed preferences. Some of those who have been concerned with organizing such programs have developed a sort of general pattern which they follow. One pattern begins with patriotic songs, college songs, marches, and polkas as opening music, and then toward the end introduces hit-parade material. Another investigator suggests that generally accepted practice is periods of twelve to twenty minutes, so that the music maintains an element of novelty. Marches for opening and marches and popular fox trots for change of shift or closing time are recommended. During the last twenty minutes of the work period, however, music is not given because it might be taken as a signal to get ready to go home. During rest periods, of course, a wide variety of music can be introduced. Obviously, there is some need for careful programming. There are also indications that the music comes through with good quality of reproduction even though there is considerable attendant noise in the factory. Music occasionally is used in offices, but it is well to suspend judgment as to its effectiveness there. One wonders, naturally, about the distracting effect when doing work which is more strictly mental.

---

[51] Smith, H. C., "Music in Relation to Employee Attitude to Piece Work Production and Industrial Accidents."

Type of work. It is possible that the effectiveness of music in general and the type of music most appropriate will depend upon the kind of work or even the individual make-up of the worker. There have been indications that workers on monotonous tasks derive more benefit from the music.[52] Perhaps, for mental work it may be desirable to have the music only during rest pauses. There may even be racial differences, for Scotch workers like bagpipe music, and others find it intolerable.

Underlying principle. We can only speculate as to why music has these effects. One point that seems fairly clear is that it influences the attention or, as many workers say, "takes their mind off" the work which may be desirable for a monotonous type of work. There is also the possibility that it may have a dynamogenic effect (page 518) and lead to more vigorous responses, which would be the case especially if the work was rhythmical and the music synchronized with it. Another thing is the over-all pleasantness produced by music through association and imagery. The music reminds one of some pleasant occasion, and that bit of revery makes what might otherwise be a dull period of work a little more enjoyable. It is another instance of an escape mechanism.

Summary

Illumination is an important variable in the working environment from the standpoint of efficiency. In general, visual efficiency improves with the increase of intensity of illumination up to a certain point beyond which additional intensity is of no value. This critical point varies for different kinds of work, and it is well for an industry to determine empirically the minimum intensity requirements for different jobs. Numerous cases have been reported where increase of illumination intensity has produced marked increases in production. Many older workers are visually handicapped at the lower intensities but, given a little more intensity than that required for younger persons, they can do every bit as effective visual work. Very fine work may require, in addition to adequate illumination, special glasses which enlarge the retinal image so that the person does not have to bend toward the work and also can discriminate it more readily.

---

[52] Reynolds, W., "Selecting Music for the Factory," *Personnel*, 1943, 20, 95–98.

Distribution of lighting has an appreciable effect upon ocular efficiency. A direct system in which bright sources in the periphery of the visual field attract the attention will often produce fatigue because the worker tends to fixate the bright source and then focus back on the work with unnecessary strain on the muscles of accommodation. Indirect lighting, on the other hand, minimizes these bright sources, and empirically much less fatigue results from working under an indirect system. Eye-shades may be used to minimize the undesirable sources, and an opaque shade with a light lining is the best type. If the lining is dark, it tends to accentuate the edge of the shade by contrast, and the worker will focus alternately the edge of the shade and the work—again fatiguing the muscles of accommodation. Although indirect lighting minimizes fatigue, it is also costly, and a satisfactory compromise is often effected by adding local light to give additional intensity on the work, still maintaining a fair degree of illumination around the room to avoid undue changes in adaptation. The distribution of the light has comparatively little effect on acuity of vision unless it is such as to produce glare or unless the work itself is of such a nature that shadows are necessary to facilitate visibility. There is a possibility that indirect lighting may have a monotonous effect and keep the operator at a lower level of attention. A uniform arrangement actually did slow down the reaction time with street illumination, and an analogous problem may exist indoors although it has not been approached experimentally. It has been shown, however, that the brightness of the illumination does have a definitely stimulating effect on efficiency. Another factor is the brightness of the immediate surroundings of the work itself. Experiments indicate that if these immediate surroundings are darker than, or about equal to, the work there is no loss in efficiency. If, however, they are considerably brighter so that the worker must become adapted to them while looking at the darker work, he is definitely handicapped.

The color of illumination has been considered with reference to its possible effect on efficiency. Monochromatic light actually produces a sharper image on the retina because it minimizes chromatic aberration. Investigations, however, do not indicate any very definite effect of color on attention level. Apparently one part of the spectrum does not have any greater dynamogenic effect than another. Fluorescent lighting does not pose new psychological problems. The important thing to consider is the location of the light sources and the question of whether there are bright spots in the field of vision which may lead to focusing back and forth.

Ventilation is a second environmental variable and has obvious relations to comfort, which depends primarily on temperature, humidity, and air circulation rather than on the chemical content of the air. Investigations with mental tests of various sorts performed under controlled ventilating conditions indicated that, when adequately motivated, persons could do mental work under very unfavorable conditions of temperature and humidity with comparatively little loss in efficiency although they felt very uncomfortable. Under practical conditions, when industrial or office workers face this same situation, they tend to compensate for the discomfort by slowing down. They may be able to do the work but they feel unwilling to do it, and the latter aspect is determinative. With heavier types of work efficiency falls off in spite of motivation. This point is borne out by various statistics from textile industries and mines where production decreases consistently with the decrease in the cooling power of the atmosphere. Another indication is the longer and more pronounced summer-time drop in production in certain factories where there is no artificial ventilation compared to the drop in the same kind of factories that do have a good installation. Accidents provide another indication of inefficiency and likewise show some correlation with unfavorable conditions of ventilation. They are more pronounced at the extremes of temperature than in the middle range.

Noise is inevitable in industries and offices and may influence the efficiency of the workers. Laboratory studies indicate a general loss in efficiency in the presence of noise, but at times the individual compensates by greater effort and may even overcompensate so that he does better with the noise than without it. Further investigations reveal that this overcompensation is at greater metabolic cost, so that the net result is unfavorable. There are further indications that this compensation involves additional muscular tension which is actually unnecessary for the task at hand. Laboratory investigations reveal a direct relation between intensity of the noise and decrease in efficiency of the worker. The relationship is not strictly linear, but, as the noise increases, there is some acceleration in the errors made in the task. Noise may be reduced very appreciably by soundproofing the walls and ceiling. There are many instances of pronounced increases in industrial production as a result of this treatment. One of the most notable was in the office of a large insurance company where systematic records of production were kept over periods with and without noise.

There is an increasing use of music as an accompaniment to industrial work. A few systematic studies have been made by designing a schedule of different kinds of music over a considerable period of time and keeping a careful record of production. In a radio tube manufacturing establishment quite clear increases in efficiency from the standpoint of less scrappage were obtained. A British industry manufacturing firecrackers showed a similar trend. In another instance there was a favorable effect on absenteeism. Quite generally when the workers are asked their own opinions about music, their comments are favorable but these, of course, are not very crucial because the questions involve an element of suggestion. A categorical answer about the actual type of music which is most desirable cannot be made on the basis of existing data. In the few careful investigations reported the results are somewhat equivocal. A few kinds of music are obviously undesirable such as those which produce a conflicting rhythm or that encourage the workers to synchronize with hands or feet. Obviously, further research will be necessary before the most effective program can be determined. Even existing arrangements which have been developed by trial and error appear to be more satisfactory than no music at all and they contribute to increased production and improved morale.

20

FATIGUE, MONOTONY, AND ACCIDENTS

The fatigue resulting from a continuous period of work may he reflected in lowered production or in feelings of tiredness. The two do not always coincide. The former has obvious importance from the standpoint of costs. The latter may be significant in connection with attitudes and morale. The physiological aspect of fatigue is fairly well established. Muscular effort involves consumption of energy which is stored in the form of sugar products, particularly glycogen. This sugar reserve is released from the liver into the blood stream and finally reaches the muscles where the sugar reacts chemically with the oxygen brought from the lungs by the blood, and gives off energy in a manner crudely analogous to the operation of an automobile engine. The nervous impulse that touches off the muscular response is somewhat like the spark-plug, and the waste-products resulting from the muscular action, such as lactic acid and carbon dioxide, are analogous to the exhaust gases which go out through the muffler. There are two things which can decrease the effectiveness of the organism as the result of prolonged work. One is the exhaustion of the glycogen, that is running out of gas. The other is accumulation of the waste-products more rapidly than they can be carried off by kidneys, sweat glands, lungs, and the like. The automotive analogue is killing the engine by putting a corn cob in the end of the exhaust pipe. Normally, the body tends to maintain equilibrium between waste and repair by means of circulation, breathing, and the use of stored-up materials, but an excessive amount of work may disturb this balance. Fortunately the nervous system serves as a protective device and ceases to send impulses to the muscle when fatigue has progressed too far. This is like a fuse in an electric circuit which blows with the advent of an overload. Direct stimulation of the muscle will cause a contraction when stimulation through the nerve supply is no longer possible.

Mental Fatigue

Rate of decrement. There are apparent differences in the fatigue produced by carrying bricks and figuring time slips. One uses the larger muscles, and the other involves very little observable activity. It may be, however, that the difference is in amount rather than in kind, and it will be well to look into this question. Mental and physical work usually differ in rate of decrement. If a heavy physical task is performed continuously for a period of time, production drops off very markedly; with a mental task, the decrement is much less striking. When persons did mental addition for a ten-hour day with a half-hour out for lunch, there were only slight decreases in efficiency, and when they took a completion test in which they supplied omitted words in a text, they did not show any great loss in efficiency during a five-hour period, although estimates as to their feelings showed a consistent decrease in pleasantness.[1] An heroic study had subjects multiply four-place by four-place numbers mentally—tasks such as 4387 times 6945—merely putting down the final product without intermediate writing. This work was performed for a twelve-hour stretch on four consecutive days. One would expect a subject to be paralyzed by the end of that time, but actually the work at the end of the end of the fourth day took only twice as long as at the outset, although it was distinctly less agreeable. The conclusion often drawn from this type of result is that one becomes less *willing* but not less *able* to perform the task with prolonged mental work or, expressed in another way, he is tired *of,* not tired *by* the work.

Insomnia. There have been studies of mental work after insomnia, which showed in a general way that here too, one could draw on a reserve of effort and do the task without much loss. Auditory choice-reaction time, giving opposites to a series of words, and canceling certain letters in a miscellaneous series, showed no appreciable loss after insomnia although there was a slight slowing down in naming colors rapidly.[2] In another case after a 40 per cent reduction in sleep for five nights, the subjects took tests of code substitution, addition, following a pursuit meter, general steadiness of posture, and a standard intelligence test. The effects were not pronounced, and after two hours' sleep, efficiency was as good as ever.[3] This should not be taken as an endorsement for the loss of sleep. The experiment did not include physiological aspects nor any possible long-time effects. It did show, however, that the insomnia could be offset by motivation over a comparatively short period of time. Another study which involved tossing balls into a basket, transcribing telegraph code, and mental multiplication after sixty-six hours of insomnia, showed that the principle effect was one of motivation rather than actual ability to perform the task.[4]

---

[1] Reed, H. B., "Fatigue and Work Curves from a 10-Hour Day in Addition," *Journal of Educational Psychology,* 1924, 15, 389–392.

[2] Johnson, H. M., Swan, T. H., and Wiegand, G. E., "Sleep," *Psychological Bulletin,* 1926, 23, 482–503.

Discontinuity of task. There are indications that a factor which occurs in mental work to minimize the fatigue is a discontinuity in the performance. There are very small, to be sure, but still finite, periods of inactivity interspersed with the actual work. They may be discovered, for example, in an electric transcription of every word spoken while doing mental arithmetic out loud. These blocks increase in length and frequency in proportion to the length and difficulty of the task. Presumably they have a recuperative function.[5] Another related point is that fatigue decrement in mental work is greater if the work itself is more similar throughout. If there is some variation in the work, the slight alternation between different tasks is tantamount to rest in one task while the other is being performed. Thus, the absence of pronounced decrement in mental work may be due partly to this discontinuous character.

Compensation. If the subject is unwilling to do the mental work, but compensates by greater effort, it should be possible to detect this greater effort by some physiological technique. As a matter of fact, there are indications of actual muscle performance during mental work. When a subject sits quietly with appropriate electrical recording devices attached to him and thinks of shaking the furnace, there are action currents in the muscles of the arm.[6] This suggests that mental fatigue might show some effect on metabolism (page 514) and it did in an experiment on insomnia. Each morning before the subjects got out of bed they multiplied three-place by three-place numbers mentally. The operation had been pursued to the limit of practice prior to the experiment. An initial run was made with the metabolism apparatus before the subjects did anything and then a run for a similar period was made during the arithmetic. The per cent increase of the latter over the former was the point of interest. Three subjects participated, and, in actual arithmetic performance, showed no appreciable loss of efficiency during a week in which they retired two hours later every night. However, in a normal week the increase in metabolism when doing arithmetic *versus* resting averaged 18 per cent, whereas in the insomnia week it was 36 per cent. The three subjects differed considerably, but all showed the same general trend.[7] Another investigator suggests that the metabolic changes are somewhat smaller than this and estimates that there is a 4 or 5 per cent increase in metabolism when doing mental work as compared with resting.[8] At any rate it is apparent that mental work involves something more than the mind. Evidently, it uses up some tissue and, although the amount may be small, it is significant. It would be analogous to saying that because the electric clock uses much less current than the electric iron, its power supply should be ignored. Whether the results reflect actual metabolic effect of cerebral activity or merely the incipient muscular adjustments which go with thinking has not been determined. It is impossible to draw a sharp line between physical and mental work; both of them take something out of the organism. In the subsequent discussion no further distinction will be made between mental and physical fatigue. Procedures which have been designed to lessen fatigue in one aspect will presumably, although perhaps to a different degree, be effective in lessening fatigue in the other.

---

[3] Laslett, H. R., "Experiments on the Effect of the Loss of Sleep," *Journal of Experimental Psychology,* 1928, 11, 370–376.

[4] Weiskotten, T. F. and Ferguson, J. E., "A Further Study of the Effects of Loss of Sleep," *Journal of Experimental Psychology,* 1930, 13, 247–266.

[5] Bills, A. G., "Fatigue in Mental Work," *Physiological Review,* 1937, 17, 436–453.

[6] Jacobson, E., "Electro-Physiology of Mental Activities," *American Journal of Psychology,* 1932, 44, 677–694.

Measurement of Fatigue

Laboratory tests. If effort is to be made to eliminate unnecessary fatigue, it is desirable to know the progress of fatigue during the working day, for example, just how tired the worker is at 10 A.M. or 3 P.M. Various tests have been evaluated as measurements of fatigue, but have not been too successful for the type of thing desired by industrial psychology. Some tests, for instance, involve muscular performance. A typical ergograph straps the arm and all the fingers but the middle one to a board and attaches to the middle finger a cord which runs over a pulley to a weight. The subject lifts this weight in time with a metronome, and the kilogram-meters of work done prior to exhaustion are recorded. Another possibility is a dynamometer which the subject squeezes to indicate the strength of his grip. Although these techniques are useful in certain circumstances, in general, they indicate merely the fatigue of a particular muscle group rather than any over-all fatigue of the organism. Chemical procedures such as analyzing a blood sample for sugar yield satisfactory results in some cases, but it is not feasible to take blood samples every hour in the mill room. Physiological techniques such as metabolic rate, or blood count, or electrical skin resistance have yielded interesting data, but primarily under laboratory rather than factory conditions. One study of basal metabolism at frequent intervals throughout the day actually was made with a group of type casters. In a seven and a half hour day they consumed as much energy in the last two and a half hours as in the first five. However such an experimental technique would be feasible only rarely.[9]

---

[7] Laird, D. A. and Wheeler, W., "What It Costs to Lose Sleep," *Industrial Psychology*, 1926, 1, 694–696.

[8] Bills, A. G., *Psychology of Efficiency*, page 75. New York: Harper's, 1943.

Some efforts to measure fatigue lie more definitely in the field of psychological tests. They have had varying degrees of success but nothing spectacular. A coordination test has on a moving belt small circles in which the subject places a dot as each circle passes a narrow aperture. Laundry workers made more errors in this test in the afternoon than in the morning, and, also, they made more errors when they stood all day than when they sat down part of the day.[10] Tests of hand-eye coordination applied to automobile drivers before and after driving ten hours showed a 3 per cent decrease in one test and a 24 per cent decrease in another, with greater variability in both of them after the driving.[11] Another reaction-coordination test which involved removing a stylus from one hole and placing it in another, showed similar trends. There were quite a few significant differences, with different samples of subjects, between the test performance after driving a truck for ten hours and the score before driving. Critical ratios were clearly significant in two out of three series, and 2.8, that is almost significant, in the third.[12] However, these last results involved a prolonged period of work. Whether the tests would be sensitive enough to detect differences in shorter periods —during a morning of work, for instance—could not be determined.

For a test of general motor control a wabble-meter has a small platform on which the subject stands. If he sways or his center of gravity shifts, the apparatus records the fact and integrates the amount of sway.[13] When persons were tested after varying amounts of sleep they wabbled more after brief sleep than after a longer period of rest. With a similar test that cumulated body sway in terms of movements of the head when the subject stood with eyes closed, there was an increase of about 8 per cent after driving an automobile 300 miles.[14] Auditory choice-reaction time showed a slight sensitivity to fatigue.

---

[9] Page, R. M., "On Supplanting the Industrial Fatigue Concept," *Journal of Business,* 1929, 2, 144 ff.

[10] Smith, M., "The Laundry Trade: Experiments with A Psychological Test," *Journal of Industrial Hygiene,* 1924, 6, 14–19.

[11] Ryan, A. H. and Warner, N., "The Effect of Automobile Driving on the Reaction of the Driver," *American Journal of Psychology,* 1936, 48, 403–421.

[12] Anonymous, "Fatigue and Hours of Interstate Truck Drivers," *Public Health Bulletin No. 265,* 1941.

[13] Omwake, K. T., "Effect of Varying Periods of Sleep on Nervous Stability," *Journal of Applied Psychology,* 1932, 16, 623–632.

In the visual field critical fusion frequency has yielded some significant results. This is determined by alternating two stimuli rapidly, for example, by rotating a disc which is part black and part white. If it rotates rapidly enough, flicker is extinguished and the disc appears gray. The rate of alternation is varied to determine the critical rate at which the flicker is extinguished. If the eye is more efficient, it will be able to take a more rapid rate and still notice the flicker. With truck drivers a slight but consistent tendency was noted toward lower critical frequency with each increase in the number of hours of driving.[15] With a group of office workers and laboratory technicians the critical frequency was found to be less toward the end of the day. This trend was not found in another investigation in which subjects worked on a treadmill for as much as four hours.[16] Perhaps this test is a fair indicator for work that puts a premium on vision but not for general over-all muscular work.

The same thing may apply to tests of reversible perspective—for example, a diagram which looks like an overhanging stairway or an ordinary stairway according to the observer's attitude and the fluctuations of his attention. With subjects who performed various tasks like checking numbers, for something over five hours (with time out for lunch) there was a distinctly greater frequency of reversal of perspective at the end of the day's work than at the outset.[17] It is probable that, as the subjects became more fatigued, they were less able to hold a given aspect of the ambiguous figure in their attention, and, as the attention shifted, the figure shifted accordingly.

There are no universally good tests of fatigue which may be applied to any type of workers to determine just how tired they are at a given stage of a day's work. It will be necessary to evaluate tests like the foregoing in the specific situation or turn to other indicators of fatigue.

Production records as indicators of fatigue. After all, production is a main consideration in hiring people, and if production falls off unduly in the course of the day, something should be done about it. In the majority of industrial operations it is possible to secure some quantitative indication of production—such as number of shells inspected, or heels attached, or even square inches of copy typed. This is not true with reference to executive work and some kinds of selling. If production records are available at different periods of the day, it is comparatively simple to plot a curve and see exactly what is happening. A curve of this sort is given in the upper portion of Figure 19. The abscissa represents the course of the day in some convenient units such as fifteen-minute intervals, and the ordinate indicates the production for those intervals. The first thing to be noted is the slight initial rise in each spell. This is characteristic, although not universal, and is the well-known warming-up effect. It is the same thing that takes place deliberately on the part of an athlete going into action. It may not occur in work that is extremely simple or very fatiguing at the outset. It is not a practice effect but occurs day in and day out on the same job. The curve soon reaches its maximum and levels off. Eventually, however, it starts down, presumably because of fatigue. The noonday rest usually alleviates the situation somewhat, and after lunch production starts out at a higher level than before lunch until it repeats the same trend. Toward the end of the day the production characteristically reaches its lowest level. Occasionally, there is a little spurt at the end of the spell, although this is more characteristic for monotonous than for fatiguing work. The anticipation of quitting time sometimes provides a little additional incentive.

---

[14] Ryan and Warner, "The Effect of Automobile Driving."

[15] Lee, R. H., "Fatigue and Hours of Service of Inter-State Truck Drivers; Critical Fusion Frequency of Flicker," *Public Health Bulletin,* Washington, 1941, No. 265, pages 195–208.

[16] Brozek, J. and Keys, A., "Flicker Fusion Frequency as a Test of Fatigue," *Journal of Industrial Hygiene,* 1944, 26, 169–174.

[17] Hollingworth, H. L., "Perceptual Fluctuation as a Fatigue Index," *Journal of Experimental Psychology,* 1939, 24, 511–519.

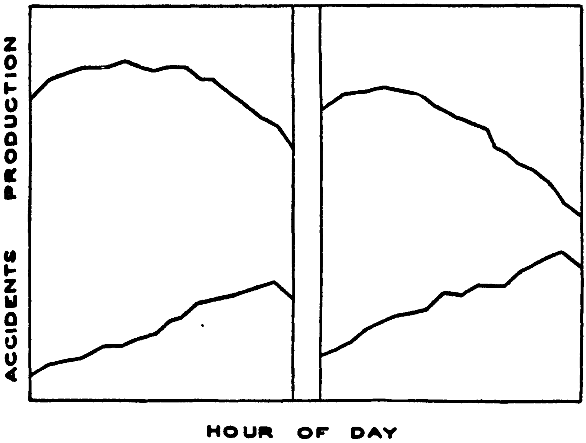


Figure 19. Typical Production and Accident Curves (Hypothetical).

The stage at which the curve begins to go down and its actual steepness depends on how fatiguing the work is. Obviously, a very fatiguing job will show earlier and more pronounced drops in production. The curves given in Figure 19 are hypothetical but are typical of what is found under actual conditions.[18]

Occasionally, it is desirable to quantify the data so as to get some kind of an index of fatigue rather than merely to note the curve qualitatively. It is possible to take arbitrary sections of the curve for comparative consideration, for example, the ratio of production in the last half to that in the first half. Some investigators prefer to use the highest production rate obtained in, say, a five-minute period as compared with the average achievement throughout the spell. Fatigue tends to lower the average production, and the difference between the peak and average production is often diagnostic. In some British factories the difference between these two figures varied from 12 to 38 per cent for different jobs.[19]

It has been suggested that variability in performance might be used as an indication of fatigue. An eight-hour day might be divided into sixteen half-hour periods, and the average production for these periods and their standard deviation (page 433) computed. The lowered production in the later parts of the spell for fatiguing work would deviate from the average and thus raise the standard deviation. The difficulty is that variability may be involved to an even greater extent in the case of monotonous work. Production drops because of monotony, and comes back again after the worker has been relieved by slowing down, thus producing marked variability.

Occasionally, it may be feasible to plot production in more detail than just the gross number of units completed. A study was made of workers polishing metal by means of recording devices which indicated the pressure used in holding the metal against the wheel, the length of time spent polishing each item, and the number of strokes made against the wheel. As the day wore on, there was an increase in the number of strokes and in the pressure, as well as in the time consumed.[20]

It may even be of interest to follow production through a week. In some British factories Tuesday and Wednesday were a little higher than Monday, there was a drop on Thursday, and a pick-up again on Friday and, possibly, on Saturday. On the other hand, in Italian factories Tuesday, Wednesday, and Thursday were about the same and a little higher than Monday, and on Friday and Saturday production dropped off. Evidently the prospect of payday and the weekend was not as effective as in the British sample.[21]

---

[18] For some actual production curves see Wyatt, S. and Langdon, J. N., "The Machine and the Worker," *Industrial Health Research Board, Report No. 82,* 1938.

[19] Wyatt, S., "Maximum Capacity and Average Achievement," *British Journal of Psychology,* 1930, 20, 251–260.

[20] Farmer, E., "The Economy of Human Effort in Industry," *Journal of the National Institute of Industrial Psychology,* 1922, 1, 20.

It is possible that production curves are complicated by diurnal variations in efficiency, quite apart from fatigue. There may be, for instance, morning workers and afternoon workers. This possibility has been subjected to considerable experimental investigation. The technique involves having the subject perform certain functions (say, taking psychological tests) at different periods in the day. It does not mean working continuously at the performance throughout the day, but taking a sample of efficiency in the work periodically—for example, a five-minute test every hour. Widely different trends in such investigations have been reported. A considerable number of such reports were analyzed and classified as to whether the trend was (*a*) continuous rise throughout the day, (*b*) continuous fall throughout the day, (*c*) morning rise—afternoon fall, (*d*) morning fall—afternoon rise.[22] In tasks that were primarily mental in character, such as taking tests or doing arithmetic, there were exactly the same number of investigators reporting class *a* and class *b*, and these classes were considerably more numerous than *c* and *d*, which likewise were about equal. The majority of the studies in muscular performance showed either class *a* or class *c*. Inasmuch as most industrial work involves muscular effort, the above analysis suggests that if there are any variations in industrial efficiency due to the time of day, there should be some improvement in performance through the morning spell, at least. Consequently, a drop in production toward the end of this spell would be all the more significant as an indication of fatigue. However, in view of the wide variation of results obtained in these studies, it is doubtful if the diurnal factor introduces any consistent error in the use of production curves as indices of fatigue.

Accidents and fatigue. Another possible indicator of fatigue is the trend in accidents throughout the working day. Analysis of records shows that many accidents can be attributed directly to fatigue. Frequent causes are inaccurate perception, lapses of attention, and slowing down of reaction time. Accident reports often include statements like, "Did not notice the rollers," or "Did not get his hand away soon enough," which suggest inadequate attention or slow reaction time. These difficulties, in turn, may result from fatigue. Another factor is the excitement and irritation associated with the effort to maintain speed in spite of fatigue. This is true particularly if the tempo is controlled by the machine.

---

[21] Niceforo, A., "Éxamen expérimentale de la fatigue dans les industries," Rome, 1929. *Cf. Psychological Abstracts*, 1930, 4, No. 2156.

[22] Freeman, G. L. and Hovland, C. I., "Diurnal Variations in Performance and Related Physiological Processes," *Psychological Bulletin*, 1934, 31, 777–799.

Therefore, it is to be expected that accidents will increase in the course of the day if the work is fatiguing. In industries that are large enough to provide adequate data it is possible to investigate diurnal increases in the number of accidents per hour or per any other time interval. The typical trend is indicated in the lower curve of Figure 19. The abscissa is the time of the day and the ordinate is the accident rate. There is a gradual increase in accidents as the morning wears on with a little drop at the very end of the period. This drop reflects the fact that the worker is slowing down toward the end of the spell and actually making fewer motions in the vicinity of possible hazards. In actual figures, an Illinois concern in one year had 150 accidents during the first hour of the morning and 257 during the last hour; in the afternoon, the corresponding figures were 111 and 260. Proportionately more accidents are found in long working days than in short. In a twelve-hour day munition workers had almost three times as many accidents as in a ten-hour day, although the total time was only 20 per cent longer. In this same sample accidents in the last hour of the morning were five times as numerous as in the first hour in a twelve-hour day, whereas the ratio was three to one in a ten-hour day.[23] When considerations like the foregoing indicate that fatigue is present in an industrial situation, the next problem is to do something to minimize that fatigue.

Technical Adjustments

Posture. Many of the procedures for increasing industrial efficiency produce their effect by way of eliminating unnecessary fatigue. These will not be considered again in the present connection but a few additional factors, some primarily physical in character, and others bordering on psychological principles, will be noted. The line between these will not be drawn too sharply.

Postural fatigue is a frequent by-product of work. Time was when the streetcar motorman spent the entire day standing up on the theory that he might go to sleep if he sat down. No particular disadvantage resulted, however, when he was provided with a seat. The same principle is involved in many kinds of industrial work. There is no point in devoting muscular energy to supporting the body weight on the feet when the work can be done effectively in a sitting posture. The seat and the work place should conform to the stature of the worker. Seats with backs and foot-rests have obvious advantages in taking the strain off certain muscles which are not involved primarily in the work itself. Sometimes a rest for the arms is important. If the forearm must be at approximately shoulder level in order to make delicate adjustments close to the eyes, a special rest may be provided for that arm so that the shoulder muscles do not have to carry that strain continuously.

---

[23] Vernon, H. M., "An Experience of Munition Workers During the War," *Occupational Psychology,* 1940, 14, 37 ff.

Mechanical devices. Mention should be made of the general principle of supplanting muscular effort with mechanical power of some sort. The workman no longer picks up a heavy iron core to put it on the tire-building machine but employs a pneumatic or electrical hoist on a traveling crane. A storage battery and motor on a small truck eliminate a lot of pulling by hand. Similarly, the motors on cash registers and some types of office machinery substitute electrical for human power with attendant reduction of fatigue.

The work place deserves some consideration in this connection. A person needs adequate space in which to work. If he is crowded physically, he may feel crowded mentally with resultant fatigue. Clutter in the work place leads to unnecessary motions and annoyance. The clerk at the ribbon counter who has to let the discarded rolls pile up behind the counter and then kick them back and forth as she walks, is a case in point. A work bench with inadequate space for the various tools and materials, so that they accumulate and have to be shoved around, causes needless fatigue.

Vibration is another factor which induces fatigue. If the floor or chair vibrates, one continually makes minor motor adjustments to it. If a boat rolls, one compensates by tensing the legs alternately. Something of this sort occurs when the floor is vibrating, and these incipient adjustments consume unnecessary muscular effort. The actual elimination of vibration is more of an engineering problem. It may involve the type of building construction or the method of mounting machinery.

Special tools. Other technical adjustments deal with the actual tools which are provided. For instance, in a steel plant uniform shovels were furnished for iron ore which was concentrated and heavy and for loose clinkers which were comparatively light. In the former case the workers became unduly fatigued and in the latter they did comparatively little real work. It was ascertained scientifically that nine and a half kilograms was about the proper shovelful if the man was to avoid undue fatigue and still do a reasonable amount of work. Accordingly, the shovels were graded, with small ones for the heavy, compact material and large ones for the lighter material. In this way, everybody picked up about the same load and 140 men did the work of 500.

Hours of Work

Extreme conditions. The remaining considerations regarding fatigue deal with the temporal aspects of the work. There are two possibilities: shortening the working period, or introducing rest pauses during the spell. In the old days many workers undoubtedly were on the job for inordinately long hours. There has been a distinct trend away from this situation, but even now, in times of crisis, such as war, persons work for very long periods. The principles can be brought out most clearly by considering some extreme conditions. During the first World War, some English munition workers were on a schedule of sixty-eight hours a week. Even with the extreme motivation of the enemy just across the channel, production was not up to what was desired. It had been assumed naïvely that a 20 per cent increase in hours would yield a 20 per cent increase in production. This was far from the case. Production decreased through the week, apparently because of a cumulative fatigue from day to day. A committee of scientists studied the matter and decided to cut the hours experimentally to sixty. As a result, not only did the output per hour increase, but the total *daily* output increased about 8 per cent. In other words, in sixty hours, more work was done than in the previous sixty-eight. This was obviously due to the reduction of accumulated fatigue which previously had carried over from one day to the next. Some data along these lines are presented in more detail in Table 35.[24] To simplify the discussion the production is reduced to a percentage of that obtained with the longest working period. The first column of figures gives the average weekly hours and the last two, the output—one in terms of output per hour and the other in terms of the total output for the week. The reduction from 58 to 51 hours for men sizing fuse bodies increased hourly production 39 per cent and actual daily production 22 per cent. There was a consistent increase in hourly production for women turning fuse bodies as the hours were reduced, but the peak for daily production was at about fifty-five hours. In a lighter operation, milling a screw thread, the daily production for forty-eight hours was slightly less than for sixty-five, with the most favorable conditions, as far as these data were concerned, at fifty-five hours. These last differences, however, were slight. It is quite obvious that to get out the greatest quantity of munitions even in the emergency, it did not pay to lengthen the working day indiscriminately, for there evidently was an optimum length. Such a length, presumably, would not be the best under peacetime motivation. A similar situation arose in the second World War. After Dunkirk there was a desperate production effort in the munitions and airplane industries, but any increase in weekly hours above sixty caused a drop in both the hourly and weekly output as well as increased loss of time. The effect was more marked with women than with men. The brief initial spurt due to the emergency soon wore off as fatigue began to get in its work.[25]

---

[24] Anonymous, *Survey of Industrial Relations,* His Majesty's Stationery Office, 1926, page 174; also, Vernon, H. M., "The Speed of Adaptation of Output to Altered Hours of Work," *Industrial Fatigue Research Board, Report No. 6,* 1920.

TABLE 35

Output of British Munitions Workers

Work	*Average Weekly Hours*	*Relative Output per Hour*	*Relative Total Output*
56 men sizing fuse bodies	58.2	100	100
	56.5	122	106
	51.2	139	122
80 women turning fuse bodies	66.2	100	100
	54.8	134	111
	45.6	158	109
40 women milling a screw thread	64.9	100	100
	54.8	121	102
	48.1	133	99

In one of our textile industries the reduction of hours from fifty-four to forty for speckers involved an hourly increase in output which was enough to bring the total output slightly above the level of the fifty-four hour week.[26] This result occurred at a time when the government was attempting to create employment by reducing hours so as to spread the work over more workers. The results came dangerously near the point of having to drop some employees instead of increasing their number. In two manufacturing plants doing about the same type of work, one on a ten-hour day and the other on eight, the daily production in the latter was 94 per cent of the maximum possible, and the former had a percentage of 90. The comparison should be discounted because it did not involve the same workers on the two schedules.[27]

---

[25] Anonymous, "Hours of Work, Lost Time, and Labor Wastage." *Emergency Report, Industrial Health Research Board, Report No. 2,* 1942.

[26] Viteles, M. S., *Science of Work,* page 275. New York: Norton, 1934.

It should be emphasized that the results depend on the type of work. In Table 35, for example, the effect of reduction in hours was comparatively slight from the standpoint of over-all daily production for the women milling a thread, whereas the results were quite marked for men sizing fuse bodies. This matter of the effective length of the working day theoretically involves some consideration of the arduousness of the work itself.

Reasons for increases in production. The reasons for results like the foregoing are fairly obvious. There is a carry-over of fatigue from one day to the next with an extremely long working week. The workers get so tired on Monday that they do not recover entirely on Monday night and start out at a little lower level Tuesday morning. This effect accumulates through the week. Another thing that often occurs is that when the fatigue becomes sufficiently pronounced subjectively, the workers set a slower pace deliberately. They save themselves for the long grind just as a mile runner does not sprint at the outset. A person tends to adjust his performance to the magnitude of the task before him. In the laboratory when subjects were instructed to squeeze a dynamometer as hard as possible, they averaged 52 kilograms on the first squeeze when they were informed that they would have to do it fifteen times, but when they expected to do it only once, they squeezed 68 kilograms.[28]

Lower limit. This increase of efficiency by reduction of hours obviously has a limit. The studies reported dealt with quite long hours, but some of them reached the point where further decrease in hours began to show a decrease in the over-all daily output. The obvious reason is that in the shorter day there is insufficient time to do the work, even though hourly output increases markedly. Another factor also contributes to this limiting point—the warming-up effect which has been noted earlier (see Figure 19, page 568). If it took an hour to get thoroughly warmed-up, one third of the time in a three-hour spell would be at a somewhat lower level of efficiency, whereas this inefficiency would be only one fourth of the time with a four-hour spell.

Incidence of the effect. A trend that has appeared in a number of these studies of shortened hours is that the resulting gain does not appear immediately. When the shifts were reduced from twelve to eight hours for steel smelters, there was no improvement for about two months, but eventually the improvement was 18 per cent. Similarly, in a heavy lathe operation of turning fuse bodies in a sixty-six-hour week the efficiency index of production was 108. When the hours were reduced to fifty-four, production rose gradually from day to day but required a month before it stabilized at 131. When the hours were reduced further to forty-seven, there was a gradual rise over a three-month period to a level of 169. The reason back of this slow rise is the tendency of the worker to save himself for the long pull and hold back in the early stages. This tendency becomes habitual and even when he goes on the new schedule, the old habit persists so that it takes him weeks or months to adjust. Consequently, if hours are shortened, it is incorrect to assume that because improvements do not occur immediately, they are not coming at all. With more intelligent workers it is well to point out what has happened elsewhere, and they may voluntarily alter their old habits.

---

[27] Goldmark, J. and Hopkins, M. D., "Comparison of an 8-hour Plant and a 10-hour Plant," United States Public Health Service, *Public Health Bulletin, No. 106,* 1920.

[28] Poffenberger, A. T., *Applied Psychology,* page 211. New York: D. Appleton, 1927.

This problem of efficiency as related to the length of the working day is not as pressing as formerly, because the present trend is toward shorter working periods anyway. However, there still are emergencies which call for heroic effort, although even then, fatigue sets a limit as to the most effective length of the working day.

Rest Pauses

Theoretical superiority. Theoretically, rest pauses should be superior to reduction of hours because of the cumulative nature of fatigue. Working two hours at a stretch is more than twice as fatiguing as working one hour. As the waste-products of combustion clog the system, they make it increasingly difficult to respond. This point may be clarified by an extension of data obtained in experiments with an ergograph where the subject lifted a weight periodically with one finger (see Table 36). After 30 contractions of the muscle, it required two hours to return to normal. For 22 contractions, the recovery time was an hour. Fifteen contractions

TABLE 36

Rest Pauses and Amount of Intervening Work

Successive Contractions	*Necessary Rest*	*Daily Production (Hypothetical)*
30	2 hours	120
22	1 hour	176
15	30 minutes	240
1	10 seconds	2400

required thirty minutes rest but twice as many contractions necessitated four times as much rest. The last column indicates what occurs hypothetically in an eight-hour day with the ergograph. If a person works on a schedule of 30 contractions and two hours rest, he has four working periods during the day and does 120 units altogether. Similarly, a schedule of 22 contractions allows only eight periods or 176 units. In the case of the single contraction followed by a rest, a reasonable assumption is two seconds for the movement—a twelve-second cycle. This yields 2,400 contractions per day. The frequent rest pauses obviously are most favorable.

General results. The theoretical advantage of rest pauses is borne out in actual practice. The classical example of the pig-iron handlers will bear repetition at this point. In those days each worker went to a freight car, picked up a pig that weighed 92 pounds, carried it to a shed, returned, and picked up another. The introduction of wage incentives hindered rather than helped. When the man was offered a typical bonus he sprinted in the early hours and became so fatigued that he was almost useless. A study of the situation indicated that it was desirable for the worker to be loaded something less than half the day, and an experiment was arranged with one worker who agreed to work or sit down when so directed. The investigator had him sitting more than half the time in short periods. Prior to this, he had been carrying about twelve and a half tons a day. With the rest pauses he carried forty-seven and a half. Most of this improvement was because he rested before much fatigue had accumulated. He may have profited also from encouragement to make his movements more rapid when he was actually working—for instance, running down the platform from the freight car, thus employing ballistic movements. Few other investigations have shown as dramatic results as this, presumably because they have not dealt with such arduous muscular work. Several schedules of rest pauses were studied in the spinning department of a large textile mill. The arrangement finally settled upon involved two ten-minute periods in each spell—the first after two hours and the next one and a half hours later. The machines were stopped and the workers reclined on cots in the aisles. Production eventually jumped from 70 to 83 units on the average, and turnover dropped from 250 to 5 per cent.[29]

Similar data for a number of jobs with a variety of temporal arrangements appear in Table 37. In only one case was there a loss in production. The average of 6 per cent improvement after several months in

---

[29] Mayo, E., *The Human Problems of Industrial Civilization*, pages 43 ff. New York: Macmillan, 1933.

TABLE 37

Effect of Rest Pauses on Output of Women Workers *

Nature of Job	*Type of Pause (in minutes)*	*Per Cent of Change in Output*	
Labeling	10′ in A.M.	13	Average: 6.2 after some months
Pressing cardboards	10 in A.M.	5	
Tying small packages	10 in A.M.	8	
Closing shoes	10 in A.M.	11	
Assembling bicycle chains	5 per hour	13	
Folding handkerchiefs	7 in A.M.	4	
Calendering	7 in A.M.	4	
Ironing	7 in A.M.	0	
Hemstitching	7 in A.M.	—3	
Folding handkerchiefs	10′ in A.M.	2	Average: 2.8 immediate effect
Ironing	10 in A.M.	2	
Stamping discs	10 each spell	1	
Polishing spoons	5 per hour	4	
Light work	7 each spell	6	

* Vernon

some jobs, and an immediate improvement of about 3 per cent in others is of interest. There is no certainty that the particular schedule involved was the very best one, but at least there was improvement.[30] A more recent study in the Tennessee Valley Authority found that rest pauses for office workers increased production 3 per cent, reduced errors in filing 50 per cent, and improved employee attitudes. The foregoing are sufficient to establish the possibility of improvement by means of rest pauses. It is unnecessary to multiply examples. The next important consideration is how to determine an appropriate schedule.

Systematic *versus* unauthorized pauses. In most jobs, unless specific provision is made for systematic rest, workers take some time out anyway. Devices used for this purpose need not be enumerated. It is simple enough for an observer to clock these pauses unobtrusively. In some typical jobs the number of idle minutes per hour were as follows: harrowing, 8; plowing, 15; picking and shoveling sand, 12; shoveling earth into wagons, 11; bricklaying, 11; loading timber, 12; three different operations in shoe making, 3; coal workers at the coal face, 5 to 9; various operations in rolling tin plate, 7.[31] The magnitude of these pauses varies as might be expected with the vigorousness of the work. In clerical work, pauses amounted to about three minutes out of an hour.[32] It has also been found that pieceworkers do not take as much time out as day workers.

---

[30] Vernon, H. M. and Vernon, M. D., "Five Hour Spells for Women with Reference to Rest Pauses," *Industrial Fatigue Research Board, Report No. 47,* 1928.

[31] Wyatt, S., "Rest Pauses in Industry," *Industrial Fatigue Research Board, Report No. 42,* 1927.

These results do not imply that workers need no rest. In many instances they feel tired and take the matter into their own hands. The difficulty is that the schedule for pauses which they set is not the most efficient. Furthermore, if a worker takes his pauses surreptitiously his fear of the supervisor's disapproval may produce tension so that he is not adequately relaxed.

An experiment showed that even persons of high intelligence were unable to figure out the most effective schedule of work and rest for themselves.[33] The subjects, college students, performed a moderately heavy task on a gym chest-weight machine, walking away from it and spreading the arms and then going forward while reversing the arm motion. The operation was performed with various schedules of rest and work. It developed that the most effective arrangement involved resting 16 per cent of the nine-hour day. Then the subjects were told to set their own schedule of rest and work which they thought would yield the greatest production. They did this to the best of their ability in the interest of the experiment, nevertheless, most of them took more time for rest pauses than had been demonstrated experimentally to be most efficient. One subject hit the optimal 16 per cent, a second took 25 per cent, another 26 per cent, and the fourth spent 41 per cent of the time in pauses. Although experience in attempting to set a favorable schedule reduced the discrepancies somewhat, the final result showed inability to approximate an optimal schedule. Hence, a scientific arrangement developed by management is better than an unauthorized system of pauses. A direct corroboration of this point was made with clerical workers who initially spent three unauthorized idle minutes per hour. After the introduction of authorized pauses only 1.2 minutes were spent in this way, and production jumped from 20 to 26 units—a statistically significant difference.[34]

Reason for effectiveness. The favorable effect of rest pauses is largely due to recovery from fatigue during the pause. In some jobs the result may be due to reduction in monotony too. It sometimes is difficult to distinguish sharply between these two features of prolonged work. There may also be some improvement in the workers' attitudes as the result of the rest pause. A group of girls assembling telephone relays were constituted into an experimental group with various schedules and working conditions. Their production improved considerably, some of which was because of the girls' appreciation of the fact that management was sufficiently interested in their welfare to make this arrangement.

---

[32] McGehee, W. and Owen, E. B., "Authorized and Unauthorized Rest Pauses in Clerical Work," *Journal of Applied Psychology,* 1940, 24, 605–614.

[33] Shepard, G. F., "Effect of Rest Periods on Production," *Personnel Journal,* 1928, 7, 186–202.

[34] McGehee and Owens, "Authorized and Unauthorized Rest Pauses."

Location of rest pauses. In most instances rest schedules have been arbitrary and not based on any systematic study of production. A survey of numerous industries indicated that the most common arrangement was a ten-minute pause—ten minutes is a convenient round number.[35] If the matter is to be approached systematically, it is sensible to consider daily production curves like that shown in Figure 19. This same type of curve is reproduced in Figure 20. At point *A* the curve starts to drop as a result of fatigue. This is a logical place to put a rest pause, just when the fatigue is sufficient to make itself manifest in production. It is satisfactory, however, to put the pause a bit later, at point *B*, if the operator knows when it is coming. The anticipatory effect of the pause is sufficient to keep production up during the interim. After the pause the curve continues level as in the dotted line. In the afternoon spell the pause occurs at *C* or at *D*. If production drops again at *E* later in the spell, another pause is introduced at that point, or a bit later at *F*. Some industrial studies bear out the fact that the pause should be introduced when the output is at a maximum rather than after it has dropped somewhat.[36] The anticipatory effect of a rest pause was demonstrated with

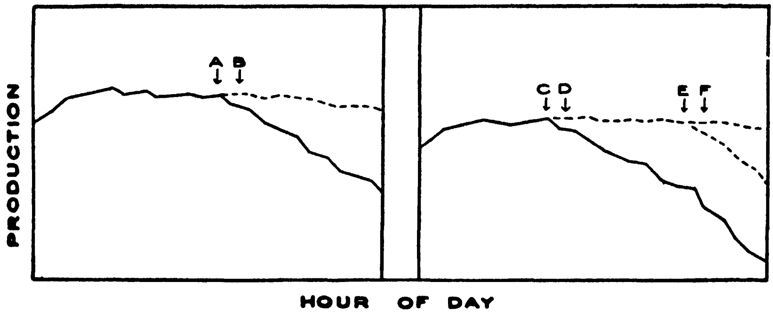


Figure 20. Location of Rest Pauses.

---

[35] Ramsay, J. and Rawson, R., "Rest Pauses and Refreshment in Industry," *National Institute of Industrial Psychology, Report No. 8,* 1939.

[36] Wyatt, S., "Rest Pauses in Industry," *Industrial Fatigue Research Board, Report No. 42,* 1927.

subjects adding digits. Some days there was a pause in the middle of the forenoon, and production after the pause was 20 per cent greater than in the corresponding period of days with no pause. However, in the mornings *before the pause* production was 12 per cent greater than in the corresponding period of the days without the pause. Merely knowing that the pause was coming increased production.

There are experimental indications that if a pause is late in a spell, it is not as effective as when it comes earlier. Production in turning machine screws was increased about 6 per cent by putting two pauses of two minutes each during a spell. One pause of five minutes at the middle of the spell produced a loss of 0.7 per cent, and the same five-minute pause about two thirds of the way in the spell was still worse, with a loss of 2.6 per cent. The effect in both cases was unfavorable, but it was more so with the pause too long delayed.[37]

Duration of rest pause. A pause should be long enough to alleviate the fatigue so that the worker becomes almost as good as ever. On the other hand, it should not interrupt the continuity of the work so that warming-up after the pause is necessary. There is also a balance between the actual time lost and the resulting gain from fatigue reduction. No fixed principles can be laid down and each job must be studied empirically if the best arrangement is desired. A good starting point for the empirical approach is to try a pause where the production curve drops (see Figure 20).

Filling of rest pauses. A further consideration is what to do during the rest pause. Practice has varied all the way from having the workers recline or take cat naps to putting them through calisthenics. Much depends on the type of work. Change of posture is an important factor. If certain muscles are under tension, getting into a different position at least rests those particular muscles. In general, the activity during the pause should not involve the same musculature that is used on the job itself. With subjects doing mental arithmetic complete relaxation during a fifteen-minute rest in the middle of the spell produced a 9 per cent increase in production, but uncontrolled rest in which the subject sat or talked or smoked as he liked produced an 8 per cent gain. Taking a walk produced only a 2 per cent gain, but the difference was attributed to the fact that it was difficult to get down to business again after the walk. Sedentary workers can change their posture during a pause or actually move about, whereas those doing heavy muscular work benefit from almost complete physical relaxation. Those standing on the job should rest seated. If the worker is allowed to do what he feels like doing in the rest pause, he frequently adopts something which is reasonably beneficial anyway. However, there is a danger of his doing the wrong thing for some ulterior motive. Girls who worked all day on their feet played the victrola and danced in the rest period. There are reports from some Russian industries of successful use of setting-up exercises for eight to ten minutes at the beginning of the work period and for five to seven minutes at the beginning of the lunch interval. Production increased 17 per cent for women in a textile plant, as against a 4 per cent increase for a control group that had no setting-up exercises.[38] Obviously, more information about this novel program is needed. It might be that a certain amount of postural fatigue was relieved by the calisthenics. In a totally different investigation where a subject squeezed a dynamometer periodically, rest pauses caused no improvement if the subject remained motionless during the pause. If, however, he moved shoulders and arms during this pause, thus introducing postural changes, efficiency improved from 2 to 14 per cent.[39] The calisthenics might also have a morale aspect.

---

[37] Richter, W., "Zur Leistungssteigerung in der Blankschrauben Fabrikation durch Einführung von Zwangspausen," *Industrielle Psychotechnik*, 1931, 8, 129–146.

Incidence of the effect. For rest pauses just as for shortened hours of work, the resulting benefit is not always immediate—presumably for the same reason. Before the official pauses the workers have been saving themselves for the long spell and it takes them a little time to catch on to the fact that they can now let themselves go in the early stages. Workers making bicycle chains required six months to reach their maximum level under a new schedule with rest pauses. In a shoe factory twelve weeks were required to derive the maximum benefit.

Attitude of workers. The effectiveness of a system of rest pauses depends somewhat on the workers' attitudes. They may be uncooperative because they feel that if they work less time they will do fewer pieces and get paid accordingly. Sometimes this opposition is met by asking them to cooperate experimentally and agreeing to pay them as much as they have been earning up to that point if the results do not come out as expected.

The manner in which the project is presented influences attitudes. Rest pauses were introduced systematically in a textile department with considerable postural fatigue, and production improved. Prior to this time, the workers had seldom earned a bonus, but presently they reached the bonus level consistently. A big rush came and management decided to abandon the pauses, with resulting drops in production to about the initial level and unfavorable attitudes. After a month management decided to restore the pauses, but had the bright idea of making the workers earn the pause by achieving a certain production level each day before receiving the rest. No unreasonable goal was set and most of the workers, if they had worked normally as in the past, would attain the specified level and earn the pause. However, there was enough uncertainty about the matter, to worry them, and production showed no improvement. Finally, management decided to guarantee the pause and implemented this decision by actually shutting down the machinery. Production very shortly stepped up above the bonus rate and remained there. The uncertainty about securing the pause had been enough to offset its beneficial effects.

---

[38] Shustin, M. A. and Harechko, I., "Psychophysiological Investigations of the Efficiency of Industrial Physical Culture," *Psychophysiology of Industrial Work*, 1936, Leningrad, pages 78–99. *Cf. Psychological Abstracts*, 1936, No. 4618.

[39] Bedale, E. M. and Vernon, H. M., "Effect of Posture and Rest in Muscular Work," *Industrial Fatigue Research Board, Report No. 29,* 1927, pages 43–46.

Objective Causes of Monotony

Another characteristic that sometimes develops in prolonged work is monotony or boredom: a person is not tired *by* the work but tired *of* it. This is especially apt to be the case with light repetitive work which results from the subdivision of labor that characterizes modern industrial organization. There was a time when a shoemaker built the entire product from start to finish. Nowadays, one person cuts the soles, another the uppers, another stitches the parts together, still another puts on the heel, and another adds the eyelets. Instead of performing a wide variety of operations, the modern worker does the same thing over and over. This procedure is indispensable to the modern tempo of production, but it does minimize the variety in the task and maximize the possibility of monotony.

Subjective Aspects of Monotony

Monotony, in the last analysis, is a subjective characteristic and is in the worker rather than in the job. This becomes obvious from the fact that two people doing the same job differ markedly in their reaction to it. A woman who packed electric lamps was interviewed. Her job was to wrap each lamp in tissue paper and put it into a carton. She did some 13,000 lamps daily and had been at it for twelve years. She testified that the work was interesting and pleasant. Many persons would find such a job deadly. When questioned further, she indicated that she sometimes grasped the lamps differently and thought about how many boxes she would fill in the next hour. Furthermore, she let her imagination run as to where the lamps were going. She would spend the morning at the ultimate locus of the lamps in the Grand Central, and the afternoon might take her to a luxurious hotel dining-room. Another woman in a chain manufacturing concern picked up a short strip of iron, put it through the last loop on a chain, laid it on a rack, and stepped on a pedal which bent it into shape. Then she picked up the next piece of iron, put it through this loop, and repeated the process several times a minute. She had performed that same operation for many years and in fact, prided herself on having antedated the then president of the company. She discussed her work enthusiastically. On the other hand, some school teachers complain that it is monotonous to teach the same arithmetic principles year after year, even though the students are entirely different. Obviously, individual differences in this respect loom large. They were brought out in one organization by a systematic survey. Investigators interviewed workers in clinical fashion and asked thirteen questions dealing with the matter of boredom in the course of the interview. On the basis of the subject's responses, the interviewer graded him on a five-point scale, where 1 meant that he was practically free from boredom and 5 that he was never free from it, with 3 representing a moderate degree. Out of some 350 workers investigated in four factories, only 3 per cent were found at each extreme, one third were slightly affected, 38 per cent moderately affected, and 23 per cent severely affected by monotony.[40] The psychologist's problem is to analyze and explain these individual differences in susceptibility to monotony.

Monotony Types

It is difficult to type individuals with reference to their reaction to repetitive work. The reasons for these differences are complex. Intelligence, emotional attitudes, interest, and attention presumably are involved. Workers have been questioned on what they think about during work and on their interests and attitudes. The following is an attempted classification of the principal types of individuals found in such investigations:

1.0 Not bored
    1.1 Low Intelligence
    1.2 Attention fully occupied
    1.3 Normally bored but adjust to it
        1.31 Divide attention
        1.32 Task automatic
2.0 Bored
    2.1 Accept it
    2.2 Maladjusted

---

[40] *Industrial Health Research Board, Annual Report,* 1937, page 12.

The first division is on the basis of whether they are not bored or are bored. Some of the former group are of low intelligence. A task which is very simple to an intelligent person may be fairly complicated to someone lower in the intellectual scale. This was brought home to the writer at a field day at an institution for the feeble-minded. One item on the program was a drill which ended in a maneuver where two lines in single file met at right angles and passed through each other—No. 1 of the first line went through, then No. 1 of the second, then No. 2 of the first line, and so forth. The man in charge told the writer that they had been working at that particular maneuver for months. What would be very simple for a normal group was extremely complicated for this low-grade sample. Simple industrial work may really be quite complicated and quite exacting from the standpoint of attention and, therefore, not monotonous to the worker low in the intellectual scale. Picking up each piece of metal is, as it were, a new experience.

Another type that does routine work with equanimity has normal intelligence but some characteristic of attention whereby even the routine performance completely absorbs the attention. It is impossible to put a finger on the exact mechanism involved. The nearest approach to it in everyday experience is when a person on a vacation, deliberately killing time, occupies his attention completely with some trivial thing. It may tie up in some subtle fashion too, with actual awareness of repetition. Some early investigations suggested that persons who were most aware of repetition were least disturbed by it. There is also a tendency for similar impressions to fuse together and be noticed less than are discrete impressions.

A third type tends to be bored by the repetitive work but manages to adjust to it. This class breaks down into two subclasses. One of them divides the attention between the task and some elaboration of it. The woman wrapping electric lamps would be a case in point. She extended the job in her imagination to include the ultimate destiny of the lamps. Setting the job in this broader perspective enabled her to adjust to what otherwise might have been a monotonous situation. Another subclass does the job automatically and thinks about something else meanwhile. If a person's outside life is replete with interesting things, these occupy the attention during the automatic work. There is danger, of course, that daydreaming may become chronic, and the person will come to live entirely in a fantasy world. If, on the other hand, his outside life is well adjusted, there is nothing wrong with this revery provided that he can do the work automatically.

One subclass of those who actually are bored by the work accepts the situation philosophically and makes the best of it. The worker realizes that the task is routine but he is getting paid for it. He takes it in his stride and gets along without too much emotional difficulty. The other subclass cannot make any adjustment of this sort and simply remains maladjusted. This sort of person constitutes the real problem for the industrial psychologist, because if he remains in the routine work, he cannot handle the situation himself as far as his attitudes are concerned.

Production Curves

Diurnal production curves for certain operations have been analyzed to reveal fatigue (see Figure 19). Such curves may be studied with reference to monotony. One investigation included such operations as winding filaments for vacuum tubes, inserting the hooks in the stems of lamps, wrapping soap, packing chocolate, and weighing tobacco.[41] It was not assumed arbitrarily that the jobs were monotonous, but individual workers were interviewed clinically in order to ascertain whether they found the work monotonous or not. With data of this sort as a criterion, daily production curves were plotted. Some typical ones are shown in Figure 21. The curves presented are not the empirical ones, but are composite and typical of trends. For the sake of simplicity only one spell of work is shown. The first curve, by way of contrast, represents a fatiguing job like the curves discussed previously. The second curve is typical of what is obtained when the job is monotonous to the individual. There is a drop in the middle of the spell when the monotony becomes pronounced, but, unlike the fatigue curve, there is a rise toward the end. If each individual motion in a routine job carries a certain element of disagreeableness, if the worker makes three instead of four of them per minute, he experiences a smaller total disagreeableness. Hence the production curve drops. Presently, however, he anticipates the end of the spell and what he will do thereafter, which produces a different emotional set, and the curve shows an upward trend. The third curve in the figure represents the situation where the job is not so arduous as to be fatiguing and not so repetitive as to be monotonous. The trend is roughly level after initial warming-up.

Mention should be made of a special type of curve that occasionally has been found. This is marked, "Special" in Figure 21. There are two drops in the spell. The first reflected the usual effect of monotony: the worker erroneously thought it was near quitting time, and anticipation of the end led to the pick-up in production. When he discovered

---

[41] Wyatt, S. *et al.*, "The Effects of Monotony in Work," *Industrial Fatigue Research Board, Report No. 76,* 1929.

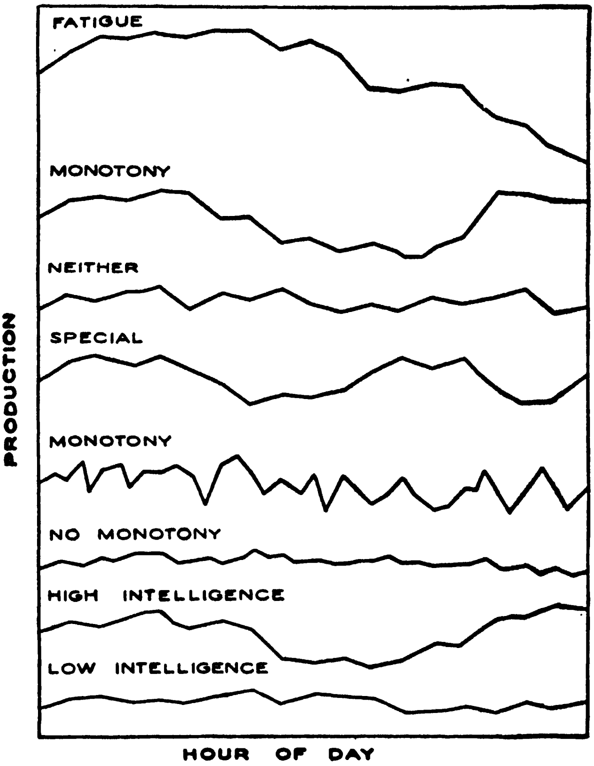


Figure 21. Production Curves and Monotony.

his mistake and became bored again, the curve dropped accordingly. Finally, when the real quitting time approached there was the usual rise.

Variability of production may indicate monotony. Workers who are slowing down to compensate for the monotony occasionally realize that they are not doing so well and have spasmodic bursts of speed. This makes for more ups and downs in production through the day. This is illustrated in the curves labeled "monotony" and "no monotony" in the lower portion of Figure 21. In these curves production is plotted for small units of time such as ten-minute intervals throughout the spell, whereas the preceding curves are smoothed to represent the over-all trend. The greater variability in the curve marked, "monotony," in contrast to the one labeled, "no monotony," is obvious. It is possible to quantify the variability by taking the production figures for each point on the curve, averaging them, and computing the standard deviation. Data of this sort are given in Table 38. Two workers were selected for several jobs, one who was bored by the job and another who was not bored. The standard deviations of production in the two cases are given. In every instance the bored worker has a higher variability in his daily production than does the one who is not bored.

Talking. Another result of passing interest was obtained by observing these workers and noting the frequency with which they engaged in conversation. There was a higher incidence in the middle of the spell when monotony was most pronounced. The workers compensated for the unpleasantness of the work by the pleasure of conversation. A certain amount of this is all right from the morale standpoint but an excessive amount affects production unfavorably. In some other studies it was found that the workers got a lot of the talking "out of their system" during rest pauses, and stuck to the job more closely thereafter.

TABLE 38

Variability in Production (Standard Deviation) as Indicating Monotony *

Job	*Bored*	*Not Bored*
Winding 1	8.7	5.9
Winding 2	8.3	6.4
Inserting	9.2	4.9
Soap Wrapping	7.1	4.5
Chocolate Wrapping	6.8	4.7
Tobacco Weighing	19.4	15.3

* Wyatt.

Measurement of Susceptibility to Monotony

Intelligence. It is desirable to have objective procedures for measuring whether or not an individual is going to be suspectible to monotony in a routine job. Some monotony might be forestalled by the simple expedient of not putting a person who is unduly susceptible in a very repetitive job. One type of test that has shown some promise in this connection is the intelligence test. In the study mentioned above of packing and wrapping operations, intelligence test scores were available. A group of ten workers were selected who rated highly, with scores of between 100 and 140, and another group of ten at the other extreme, with scores from 17 to 50. The individual production curves were plotted and fell into two distinct patterns corresponding to the intelligence of the two groups. These patterns are indicated in the two typical curves at the bottom of Figure 21. Nine out of the ten workers of high intelligence showed the characteristic drop in the middle of the working period —the pattern which is typical of monotony. Only one of the ten in the group of low intelligence showed anything resembling a drop in the middle of the period. When they were interviewed, the members of the first group expressed an awareness of the monotony, whereas the statements of the others gave very little indication of that sort.

This relation between intelligence and susceptibility to monotony suggests the earlier discussion (page 198) regarding upper critical scores in intelligence tests. With high-grade clerical jobs there was more turnover for workers of low intelligence, but with low-grade jobs there was greater turnover for workers of high intelligence. It is possible to be too intelligent for a job, and one element in this maladjustment is monotony.

Rate of decrement in laboratory tasks. Another approach aimed more directly at a test of monotony puts the subject through a simple laboratory task repeatedly, records production for small units of time, and notes any decrement in production as time goes on. One such test involved a small metal plate containing a series of half-inch holes arranged in regular rows. The subject inserted a metal stylus in each of these holes to touch another plate half an inch below the first. Correct contacts were recorded electrically, and so were incorrect contacts with the edge of the hole. In one part of the test the subject simply went across one row after another for a period of ten minutes. The production in the second half of this period relative to the first showed a decrement, perhaps due to monotony. This decrement was not evaluated in absolute terms, but, by way of comparison, the subject performed another operation with the same apparatus, following sequences of diagonal rows in various directions. The two tasks were very similar in the motor aspect but, from the subjective standpoint, one was uniform and the other varied. The notion was that if an individual subject was quite disturbed by the monotony, he would show an appreciably greater decrement on the uniform than on the varied task, whereas if he was not particularly susceptible to monotony, the two decrements would be similar.

A test of this sort must be validated against a criterion, just like an aptitude test. Close acquaintances (fraternity brothers) of the subjects rated them on their daily behavior with reference to such questions as whether they sought variety or were content with the same things over and over. These ratings were supplemented by a blank which the subjects themselves executed dealing with habits and preferences. From these two sources an index of susceptibility to monotony was derived for each subject. These indices were correlated with test scores to determine validity. With the test just described the correlation was .39.

Other tests of this general type have been tried out. One comprised two metal pegs six inches apart on a board. The subject was provided with an endless belt made of small rings connected together by strings of such a length that when two adjacent rings were placed over the pegs, the string between them was taut. The task involved removing these two rings, moving the string along, putting on the next two rings, removing them, moving the belt, and so forth. For the varied task, one of the pegs was movable and the lengths of string were different so that an adjustment had to be made each time. Here again, the comparative decrement on the two tasks was of interest.

Combining several such tests together with some other quantitative data based on personal history by the partial correlation technique, it was possible to derive a regression equation that had a multiple correlation of .71 with the criterion of susceptibility to monotony.[42]

Time estimation. Popular observation indicates that time drags during a monotonous task. This fact has led to the suggestion that estimation of time during a standard task might give some indication of susceptibility to monotony. There have been a number of investigations along this line in which the subjects performed constant and variable tasks and estimated the length of the working period in each instance. The results are not very clear-cut. The task of putting rings over the pegs showed no trend whatever. Another which involved copying designs found a 12 per cent underestimation when the subject was well motivated in the initial series where the task had an element of novelty, but a 4 per cent overestimation later. However, the difference is not statistically significant.[43] Some interviews of industrial workers in England found that when they were working on a routine task the day seemed longer. This approach would be of no value as an actual test. Another study brought out an additional point. In this case the subjects sometimes looked at a blank wall, sometimes did a monotonous job with pegs, and sometimes did a more complicated job involving cutting and pasting designs. They pressed a key every time they thought a minute had elapsed. A novel feature brought out here was that persons who were accustomed to routine work were fairly accurate and consistent in their time estimates, whereas those who were not accustomed to routine overestimated and also had greater variability in their estimates.[44] The interpretation of these results is not clear. It may be that getting accustomed to routine made the subjects less sensitive to the lapse of time. On the other hand, it is possible that these individuals were well adapted to routine work anyway, were not susceptible to monotony and gravitated into that kind of work, and for the same reason did not overestimate time in the experiment. These few studies are not encouraging from the standpoint of using time estimation as a test of susceptibility to monotony. A study of women in a chemical factory suggested that the more extroverted were more bored by the work. This point might be explored further because extroversion can be measured after a fashion.[45]

---

[42] Thompson, L. A., "Measuring Susceptibility to Monotony," *Personnel Journal,* 1929, 8, 172–196.

[43] Burton, A., "Further Study of the Relation of Time Estimation to Monotony," *Journal of Applied Psychology,* 1943, 27, 370–379.

[44] Lossagk, H., "Experimentelle Beiträge zür Frage des Monotonie–Empfindens, *Industrielle Psychotechnik,* 1930, 7, 101–107.

Alleviation of Monotony

Selection of workers. Inasmuch as monotony produces lowered production or unfavorable attitudes, it is desirable to eliminate it as far as possible. One obvious remedy has been implied above—scientific placement of employees. Some individuals are susceptible to monotony and others are not. Obviously, the former should not be placed in routine jobs, whereas the latter may serve there with impunity. Tests like those described will differentiate such individuals in the employment office. The applicant should be placed not merely in a job for which he has the aptitude, but in one to which he is emotionally adapted as far as repetitive work is concerned.

Making work interesting. Another measure that will help reduce monotony is to make the work itself more interesting. The worker may be told more about his job in relation to the finished product, so that he sees his task in a larger setting. The small gear on which he works routinely is a very important part of a bomber. It adds a little interest to know about the raw materials and their sources. The ultimate uses of the product may be featured and, perhaps, the magnitude of the business. Workers who were cutting spokes to go in the wheels of binders were given figures on how many binders their daily output of spokes would implement and how far the binders would reach end-to-end. In some war plants the workers were given dramatic evidence of the use of the product. Airplane workers were shown moving pictures of the planes in action in the Pacific. Workers who helped make block-busters were shown reconnaissance pictures of European cities after the busters had been applied. When they went back to their routine work they had a better idea of what it was all about. There are possibilities, too, in providing a more congenial workplace. Music, for example, seems to relieve monotony.

---

[45] Wyatt, S. *et al.*, "Fatigue and Boredom in Repetitive Work," *Industrial Health Research Board, Report No. 77,* 1937.

Outside interests. Some persons manage to adjust themselves to routine work, which would otherwise be disagreeable, by thinking of pleasant things during part of the working time. If this technique is to be successful, they must have pleasant things about which to think. This means that their outside life must be well adjusted and interesting. Some workers' outside lives, unfortunately, are dull: they have a narrow range of interests, and there is little that they care to do in their spare time. They just sit. Such a person has nothing to occupy his attention when it is feasible to think about extraneous matters during his work. The solution is to develop and cultivate outside interests. The firm can help by providing some opportunities for this education for leisure. This may involve night school at the plant or at some nearby educational institution. If the program broadens the workers and gives them wider interests, there will be a carry-over of this favorable adjustment into their attitudes on the job, which will help minimize monotony.

Change of work. When the work is monotonous, the individual tends to slow down. This suggests the possibility of getting less monotony by switching to another type of work occasionally. Sometimes it is feasible to have the workers alternate their activities during the day. On a punched-card bookkeeping job the girls sometimes punched cards for the entire eight-hour day and sometimes alternated punching with calculating machine work or other types of clerical work. When they made one change or one alternation in the spell, production was about 3 per cent greater than with no alternation. When they made two changes, the improvement was 5.5 and with three changes, it was about 3 per cent. More than three changes were unfavorable.[46] A systematic alternation was better than a random one. In another experiment three persons performed three types of work: mental arithmetic, addition on a computing machine, and a simple type of muscular work. Some days they spent the entire five hours on one task, and on the others they changed every fifty minutes. Every task for every subject was done more effectively when it was part of an alternating schedule than when it was performed continuously. The improvement in output ranged anywhere from 2 to 24 per cent, and improvements in accuracy from 9 to 55 per cent.[47]

Many industrial operations lend themselves to an arrangement of alternating activity. When two workers operate a machine together, one on each end, they may change places to get some variety. It sometimes proves worth while for a skilled worker to complete a certain unit and then go and get the stock for the next unit instead of having some unskilled helper supply him with the stock. Although this appears to be a waste of expert time, it does break the monotony.

---

[46] Krause, E., "Der Wechselantrieb als Leistungsfaktor," *Industrielle Psychotechnik*, 1933, 10, 269–278.

[47] Wyatt, S., "On the Extent and Effect of Variety in Repetitive Work," *Industrial Fatigue Research Board, Report No. 26,* 1924, pages 26–27.

It is possible, however, to have too much variety in a job. In a drug concern where a wide variety of orders had to be filled, it proved better to work for a little while, at least, on one special kind of job rather than have every single task different. Too much shift of attitude and unnecessary warming-up reduced efficiency. The workers accomplished from 17 to 20 per cent more on the days when they did not have too many changes.

The relation between the two jobs that are being alternated must be considered. If they are too similar, there are interfering habits or associations and, also, insufficient variety to give relief. One series of an experiment involved either naming geometrical forms or substituting a code number for each form. The two tasks were very similar for they dealt with the same forms and differed only in the matter of naming or giving code numbers. It required 80 seconds to perform a standard amount of a task when it was done continuously and when the tasks were alternated, the same amount of work required 100 seconds. After practice the corresponding figures were 75 and 88. The same schedule was employed with two other tasks—naming the opposites of words in a list and subtracting 3 from each member of a series of two-place numbers. In this case the alternating arrangement required less time at the outset—54 seconds, as compared with 62 when the tasks were performed separately. In successive trials the alternating task was always done in the shorter time, although the differences toward the end were not large.[48] When an alternation of tasks to relieve monotony is being planned, it is important to consider the similarity between jobs and strike a happy medium between confusing similarity and undue discreteness, which necessitates warming-up and shift in attitude.

Work schedule. A final possibility is variations in the schedule of work. Rest pauses have reduced fatigue and they have helped also with work which presumably was monotonous rather than fatiguing. If the work becomes annoying because of monotony, actually stopping brings some relief because the monotony is associated with the work. Another related point is the actual amount of material provided at the outset. It was shown earlier (page 497) that when subjects were given a large number of arithmetic problems—enough to keep them busy for the whole experimental period—they did not do as well, particularly in the early stages, as when they were given small successive assignments. There is some satisfaction in seeing a portion of the work completed. If a worker is provided with a tray containing enough parts for assembling numerous units, it brings home to him too vividly the fact that he has a long way to go. If he starts out with a more modest assignment, there is satisfaction when he gets the first portion cleaned up, and he proceeds from batch to batch with greater equanimity.

---

[48] Jersild, A. T., "Mental Sets and Shifts," *Archives of Psychology,* 1927, No. 89, pages 51–55.

Psychology and Accidents

It is scarcely necessary to substantiate the point that there are too many accidents. The National Safety Council reported that in 1940, in the United States, one person was killed and 99 injured accidentally every five and a half minutes. In 1936 the United States Bureau of Labor Statistics estimated that the actual cost of insurance and medical benefits amounted to $150,000,000. Then there are numerous indirect costs such as spoiled work, time required by other people to help out in the emergency, and damaged equipment. Psychology comes into this picture because of the fact that many accidents are caused by shortcomings of the worker rather than of the machine. Even the phraseology of accident reports indicates this—"did not notice" something, or "did not get away soon enough." Such statements point directly to attention and reaction time. Occasional studies have attempted to classify a large sample of accidents as to cause. Ten per cent of some 250,000 traffic accidents were attributed to failure to react properly, 40 per cent to lack of attention, and 20 per cent to inadequate conditions for observation. In a sample of accidents in the metal industry 15 per cent were due to defective machinery, 10 per cent to unexpected incidents, 10 per cent to ignorance of the danger, 15 per cent to physiological defects, 10 per cent to low intelligence, and 30 per cent to carelessness. The presence of the "human factor" is obvious. Hence, psychology has a stake in the problem of decreasing accidents.

Individual Susceptibility to Accidents—Problems of Selection

Existence of accident-prone individuals. Evidently there are many persons with characteristics that increase the probability of their having accidents. Some of these characteristics are similar to aptitudes and thus create a placement problem. Others lie in the field of habit or information, and the problem is one of training. First, it is well to establish the existence of these accident-prone individuals. A study of taxicab drivers found that 10 per cent of the drivers with the worst accident records actually had 32 per cent of the total accidents.[49] In a steel mill it was observed that those who had many hospital visits for various accidents in 1938 had many visits in 1939, too. Those who had no hospital visit in 1938 averaged .7 in 1939, those with one visit in 1938 had 1.1 the next year, those with two visits in one year had 1.5 the following, and the figures increased consistently up to those with eight or nine visits in the first year and five in the second.[50] The gross figures might have been influenced by the fact that some jobs were more hazardous than others, but when the data were broken down by jobs, the same trend was found in each of the eleven jobs.

In the Boston Elevated Railway 27 per cent of the operators had 55 per cent of the collision accidents. When the data are analyzed from a different standpoint, accidents in one year were correlated with those in subsequent years. The correlation of the first and second years was .51 and of the first and third years, .43.[51] Other studies have shown that individual susceptibility to accidents is more constant than susceptibility to illness. A correlation between two successive periods was .62 for accidents and .38 for illness.[52]

Aptitude tests and accidents. The existence of these accident-prone individuals is a challenge to the scientist, and it is desirable to discover them before even the first accident. The approach is essentially the same as that used in developing aptitude tests. In that case tests were selected on the basis of job analysis, were given to workers, and were correlated with the criterion or index of efficiency on the job. The procedure in the present case is identical except that the criterion is accidents rather than production or supervisor's estimates.

Efforts along this line have met with moderate success. In some British industries the criterion consisted of the individual accident rate expressed as a percentage of the average rate. Various tests of a psychomotor type were correlated with this criterion, and three of them had some validity.[53] One was visual reaction time (pressing telegraph keys in response to lights); another was a dotting test (an endless belt on which small circles were arranged irregularly passed underneath a narrow slot, and the subject had to put a dot in each circle as it passed the slot); a third test was a pursuit meter (the subject followed a moving pointer). The tests were weighted by partial correlation. Those workers who were better than the average in the weighted test scores had an average accident rate of 77; those worse than the average in the tests had an average rate of 125. The difference between these averages was something over three times its standard deviation and obviously significant.

---

[49] *Preventing Commercial Vehicle Accidents.* Metropolitan Life Insurance Co. New York, 1929.

[50] Tiffin, J., *Industrial Psychology,* page 423. New York: Prentice-Hall, 1947.

[51] Slocombe, C. S., "Consistency of Operating Efficiency," *Personnel Journal,* 1930, 8, 413–414.

[52] Lautier, H., "Contribution to the Study of Individual Factors in Industrial Accidents," *Travail Humain,* 1937, 5, 392–407.

[53] Farmer, E. and Chambers, E. G., "A Psychological Study of Individual Differences in Accident Rate," *Industrial Fatigue Research Board, Report No. 38,* 1926.

The relation of intelligence to accident-proneness is equivocal. In the British investigation the relation was negligible. On the other hand, in a vocational school in New Jersey a positive relation was obtained. Almost all the boys in the lowest 20 per cent in intelligence had some injury during the two years before the investigation.[54] Obviously, it would be necessary to validate intelligence tests in a specific situation before using them to screen applicants relative to accidents in that situation.

More work has been done on psychological tests as related to accidents in automobile driving than as predictive of industrial accidents in general. Some projects of this sort were described earlier in illustrating the development of aptitude tests (page 435). One of the most extensive projects of this sort was conducted by the Harvard Traffic Bureau.[55] One test involved a moving panorama of a highway to which the subject reacted with appropriate controls. It included such things as steering in the presence of other vehicles, and ability to react quickly with the brake pedals. There was a special test involving judgment of speed, and a considerable number of visual and auditory tests. The various tests showed some correlation with accident records. Individual profiles were interesting. For example, a person who had had some five accidents in the last eleven years was consistently low in steering, braking, sensitivity to glare, was normal in some respects, and high in only one—the absence of astigmatism. Putting a finger on the weak spots as revealed by a profile may pave the way for constructive suggestions. Attention should be called to one hypothesis which has not been corroborated on any extensive scale but does suggest some interesting possibilities. This is the notion that a person's comparative effectiveness on the perceptual level *versus* the motor level has some relation to his accident-proneness.[56] Three motor tests involved putting pegs into small holes in a board, turning machine screws into holes in a metal plate, and using tweezers to pick up very small pegs and put them in holes in a board. Two perceptual tests involved sorting small metal spirals according to the location of a small hole in each and sorting cylinders similar to the cases of metal pencils according to color. All scores were converted into percentiles. For each subject the average percentile on the motor tests was subtracted from the average percentile on the perceptual tests. An accident index was based on number and severity and was corrected for length of service. The severity was based on an estimate by the nurse in charge. The results showed that a larger index of perceptual-minus-motor was associated with a smaller accident index. For 40 workers the top half in the test index had an average accident index of 7.7, whereas the worst half in the test index had an accident index of 25.0. The possibility of validity for a *relationship* between two tests is not a new principle and, in fact, is implicit in the conventional regression equation.

---

[54] Henig, N. S., "Intelligence and Safety," *Journal of Educational Research,* 1927, 16, 81–87.

[55] De Silva, H. R. and Channell, R., "Driver Clinics in the Field," *Journal of Applied Psychology,* 1938, 24, 59–69.

[56] Drake, C. A., "Accident-Proneness, A Hypothesis," *Character and Personality,* 1940, 8, 335–341.

Tests analogous to aptitude tests are useful in the field of accident prevention, but only for the specific jobs where the tests have been validated. Although it may develop ultimately that there is some type of general accident susceptibility so that a certain individual would have accidents more frequently than the average in any kind of work which he undertook, there is inadequate evidence of any such thing at present.

Some other factors that render certain individuals prone to accidents lie in the field of attitudes. A person may be well coordinated, and quick, and alert enough to engage in a hazardous occupation with impunity, but just will not exercise due caution. He overtakes a car in the face of oncoming traffic and can't wait or he can't be bothered with the goggles for a brief grinding job. Recklessness or carelessness do not lend themselves to the ordinary aptitude test approach, because if a test situation is set up which puts a premium on taking a chance, the subject is liable to be suspicious. Sending an observer to ride with a driver and rate him on his recklessness or carelessness is ineffective. The ultimate answer to this problem lies in the field of indirect measurements of personality along the lines mentioned earlier (page 204). Some hints were given about tests in which the real purpose was not apparent to the subject or in which the test was scored in some indirect fashion to get at the variable under consideration without the subject realizing it. A test for recklessness was described in which the subject balanced a steel rod so that when he released it, it would remain in the air as long as possible before falling over and hitting a hoop. The actual recklessness score was the length of time he held the rod before releasing it. If tests of this sort are developed and have adequate validity, they may well be used to supplement aptitude tests in screening applicants for hazardous jobs.

Although recklessness is the most obvious of the attitudes related to accident-proneness, there are others which are more subtle. One investigation yielded a hint that some of the accident-prone individuals in the sample had a negative attitude toward authority and a tendency to ignore it or impulsively try to escape from it. Such individuals sometimes took a chance because authority had been insisting otherwise. Some of this, to be sure, may have been due to lack of tact on the part of persons who were enforcing the rules. On the other hand, some persons do have a definite attitude of that sort, possibly resulting from earlier traumatic experiences. One investigator suggested that the Rorschach ink-blot test might have possibilities for detecting such individuals.[57]

Susceptibility That May Be Modified

Some individual proneness to accidents derives from characteristics like slow reaction time or poor coordination which cannot be modified appreciably and thus constitute a permanent and unchangeable hazard. There are other characteristics, however, which are amenable to modification. One of these is skill in the operation involved. There are instances in which it is dangerous for a person to operate a device or machine until he has adequate training in some pattern of skills. An obvious case is the student-pilot who is not permitted to solo until he has received adequate dual instruction. Similar principles apply to driving tractors or operating cranes. Until the new worker has acquired sufficient skill at least there should be an experienced person in the vicinity to meet emergencies.

Another contributory factor is ignorance about hazards or lack of adequate information. An electric lineman climbed a tower to make certain adjustments, assuming that because some neighboring towers were dead, this one was too. His fatal error was due to unfamiliarity with the switchboard connections. A man took a job in a chemical plant which involved drawing off specified amounts of material from large storage tanks. Sometimes the spigots stuck. He had previously worked at a plant where the spigots were metal, and the standard practice had been to tap the spigot with a hammer to loosen it. In his new job no one took the trouble to inform him that the spigots were porcelain. He was deluged with acid at the first tap. Then there is the situation where the foreman tells the worker about the hazard but the worker does not understand him. This is liable to occur with illiterates or persons with a language handicap. The foreman tells him to look out for the high voltage and he assents, but has no real notion of what was said. Even if the foreman specifically asks him if he understands he says "yes" rather than reveal an embarrassing ignorance. The obvious remedy is for the foreman to give his instructions or explain the hazard and then make the worker repeat it back to him in his own words.

---

[57] Dunbar, F., "Medical Aspects of Accidents and Mistakes in the Industrial Army and in the Armed Forces," *War Medicine,* 1943, 4, 161–175.

The same difficulties pertain to printed materials and danger signs. If the sign actually reads, "5000 volts," and the illiterate worker thinks it says "rest room," the possibilities are obvious. Incidentally, with rules and signs dealing with safety it is a good idea to give the reasons back of the pronouncement instead of merely making it arbitrary. Sometimes a tabu can serve as an intriguing stimulus for curiosity. It is much like "Do Not Open 'till Christmas." In addition to telling the person to keep away, inform him of the high voltage; or in addition to telling him not to open a door, tell him that it leads to a shaft with no stairway.

Alcohol. A final individual factor in the causation of accidents is alcohol. Under ordinary factory conditions it may not be much of a problem because any considerable amount of drink usually is detected by the supervisor. However, in operating automobiles, commercial or private, there is a considerable hazard and sometimes, too, an industrial worker with a hangover constitutes a safety problem. Alcohol interferes with effective performance in four major ways: in the first place, it makes for poorer attention to external signals and other crucial things in the environment—the individual is less alert; secondly, there is slower response on the part of eyes, hands and feet—reaction time with the larger muscles is slow; a third factor is the lesser degree of dependability or the increased variability in performance—the individual not only is slower but he is more erratic; finally, there is an illusory increase in self-assurance—he feels confident and almost euphoric, so that he is inclined to take a chance. In driving a car, for instance, he assumes that he has the right of way. These characteristics have obvious implications as to the probability of accidents.[58]

Environmental Factors

Fatigue. Reference should be made at this point to the earlier discussion of fatigue as related to accidents. It will be recalled that an analysis of the incidence of accidents throughout the day showed in many jobs a gradual increase, presumably correlating with the increased fatigue. The various measures suggested for reducing fatigue contribute to accident prevention. Technical adjustments and change of the working schedule are pertinent (see page 571).

---

[58] Miles, W. R., "Alcohol and Motor Vehicle Drivers," *Proceedings of Highway Research Board,* 1933, pages 362–379.

Illumination. In the previous discussion of illumination it was pointed out that inadequate intensity sometimes makes it impossible for a worker to perceive the hazards. Discarded scrap material or a misplaced tool in an inadequately lighted aisle may trip him. Even warning signs may be imperceptible because of low level of illumination. The National Safety Council has estimated that poor lighting is a direct cause of 5 per cent of industrial accidents and the contributing cause in about 20 per cent.[59] In a number of British industries such as dock work, textiles, ship-building, foundry, and soft drinks, it developed that there were roughly 25 per cent more accidents during hours when artificial light was used than during daylight.[60] It is much the same story with highway lighting. A well-lighted road near Washington had 2.87 accidents per million vehicles per mile. During the depression, the lighting was decreased, and the accident rate jumped to 7.02 for a similar period.[61] Striking reductions in accidents in various cities have been reported after modernization of street lighting.

Ventilation. Poor ventilating conditions, as suggested earlier, not only decrease production but sometimes increase accidents. There have been indications in some industries of a rise of accidents in midsummer when no artificial ventilation was employed.[62] A study was cited (page 545) in which the fewest accidents occurred at moderate temperatures. Below that point the hands became somewhat stiff and more clumsy, and at the higher temperatures the discomfort and its distracting effect caused difficulty. Thus, good artificial ventilation, in addition to improving production and morale, may also make some contribution to the accident problem.

Emotional Factors

An emotional condition is a rather disorganized, inefficient state. A boxer who gets really angry swings wildly and leaves his chin open. When the house catches fire the occupant runs about aimlessly and carries out the wrong things. By the same token, an industrial worker in an emotional condition is liable to make aimless and perhaps dangerous motions.

---

[59] Resnick, L., *Eye Hazards in Industry,* page 180. New York: Columbia University Press, 1941.

[60] Vernon, H. M., *Accidents and Their Prevention,* pages 84 ff. New York: Macmillan, 1937.

[61] Anonymous, "Road Lighting in the United States," *Nature,* 1937, 139, 241–242.

[62] Kitson, H. D. and Campbell, C., "Seasonal Fluctuation in Frequency of Industrial Accidents," *Journal of Industrial Hygiene,* 1924, 5, 408–409.

If a workman is tormented by his colleagues, and reacts violently to a joke which is played upon him or to an insult, he receives many return engagements. The others derive pleasure from seeing him blow up so easily. However, in this process of blowing up he may encounter some hazard. In such instances it is desirable for the boss to break it up if possible. This is done sometimes by explaining to the fellow workers what is liable to happen and urging them to lay off or by pointing out to the victim that if he ignores the unpleasant remarks they will soon be discontinued. Again, the worker may be disturbed because he dislikes the job itself or the boss, and he may be preoccupied with his grouch so that he fails to observe sources of danger. Efforts to improve morale are pertinent at this point. A worker, too, may experience anxiety about a possible hazard and be oversolicitous, like the overcautious driver on the highway who snarls up traffic because he is afraid of getting into trouble. The remedy is adequate information about the operation and the hazards so that the worker knows just what the limitations are and how far he can go with impunity. Sometimes there is an initial emotional tension at the beginning of the spell which gradually settles down. This was noticed particularly in some British industries on the night shift, which began with the workers somewhat excited and careless. A little more alertness on the part of the foreman in the initial minutes of the work and a word of caution here and there is advisable.

Emotional carry-overs. Other emotional disturbances which contribute to accidents consist of hangovers from emotional disturbances outside the plant. A man who comes to work in an emotional state which operates as a distraction—he broods over his troubles when his attention ought to be on the stock that he is cutting—is a hazard. A man who is worrying about sickness at home or an overdue installment on the furniture may be morbidly preoccupied at a critical point in the industrial operation. On the other hand, the emotion may lead to overt expression in some excess fashion. The worker who lost the skirmish at the breakfast table comes down to work and fights the band-saw and perhaps loses that battle also. The tendency was noted for emotions to involve excessive, random, inefficient movements, and these movements may well be carry-overs from emotions that started outside the plant.

Some of these difficulties are beyond management's control, which cannot restore domestic harmony nor interfere too much with the conduct of the home and the atmosphere prevailing there. In some instances it may be possible to work through an acquaintance or a social worker. Somebody may drop a helpful suggestion now and then, but paternalism must be avoided. However, if a person arrives on the job with some emotional carry-over, it is possible to do something at that point. One foreman makes the rounds first thing every morning and locates any difficulties. He merely greets every person in the department with a cheery good morning and notes carefully what kind of a reply he receives. If the response is cheerful, he assumes that everything is all right, but if he gets a surly response or none at all he makes a mental note of it, comes back a bit later, and engages the employee in conversation. If he finds out what really is the trouble he does something about it. If it is a matter of worry, he provides a modicum of cheer and points out that things are not so bad after all. If there is anger carried over from some outside source which is not a matter of public information, he can at least introduce something of a distracting nature to change the mood.

Quite apart from specific outside emotional stimuli there are indications that workers have normal ups and downs in the emotional sphere. An elaborate study of these was made by one clinical psychologist who lived in an industrial community for a period, became well acquainted with the men, visited their homes, had excellent rapport, and was able to study them in clinical fashion. He was particularly interested in their emotional responses.[63] He rated certain men whom he followed closely through a considerable period day in and day out as to emotional level, among other things. He found that the average man was "low" about 20 per cent of the time. Some of this was due to home difficulties or to worry about the job, and some to fatigue or loss of sleep. He noted further that, out of about 400 minor accidents which his particular sample of employees experienced, over half were during these low moods. This point fits in with the previous suggestion that the foreman give some consideration to locating workers who are in an unfavorable part of the cycle and apply informal therapy.

Clinical Approach

Another approach to the accident problem is to analyze the individual case in detail. A combination of agencies for this purpose constitutes an "accident clinic." Some organizations have such a clinic officially organized, containing a personnel man, a medical man, a psychologist, a representative of the workers, and one or two other experts. When an accident occurs, if the worker will ultimately be able to return to the job, all the available data are collected and surveyed by the clinical staff with a view to determining the real causes of the accident and the prognosis. This seems to be locking the barn after the horse is stolen, and it necessitates waiting for an accident before anything is done. However, in the light of earlier discussion of repeaters, if everybody could be cured after one accident, it would make quite an inroad on the accident problem. Moreover, some of the things that are discovered in the accident clinic are of such a nature that they would not have been obvious through any prior diagnostic procedure such as tests.

---

[63] Hersey, R. B., "Emotional Factors in Accidents," *Personnel Journal,* 1936, 15, 59–65.

In a street railway company a motorman had a number of accidents, all of the same sort—running into the car in front of him. The clinic presently discovered that all the accidents were on Sunday. The only apparent difference between Sundays and weekdays was that on the former he drove a heavier car. The problem was solved by riding with the motorman and observing his habits of driving. He was an expansive type of person who liked to put on a good show and when he came into a station or up to a stop, he did so wide open and applied the brakes at the last possible moment to make a dramatic stop. He was skillful enough to stop his car a foot or so short of the car ahead of him on weekdays. On Sunday, however, the heavier car had greater momentum and required a little longer distance in which to stop. He did not adjust himself to this greater momentum but applied the brakes in accordance with his weekday habit. Once this difficulty was located, it was comparatively simple to give him a lesson on momentum and slow him down somewhat with the result that he returned to the job with impunity. A bus driver, similarly, always was hit on the left rear end. It developed that his habit was to cruise near the curb and then come out suddenly into traffic. This habit was easily corrected. In such an accident clinic in a street railway company thirty-three operators with high accident records had 81 per cent fewer accidents during the six months following their study by the clinic than during the previous six months.[64]

Automobile driver clinics. Similar procedures have been used in connection with automobile drivers. In a few places drivers have been required by the police to go through such a clinic after an accident. Other persons have entered the clinic voluntarily, as at state fairs or other public gatherings. In the clinic it often is possible to put a finger on some psychological shortcoming which renders the driver more likely to get into trouble, and which can be corrected or for which allowance can be made. For instance, a driver with several accidents behind him attends the clinic, and it is discovered that his most outstanding handicap is slow reaction time. In a laboratory situation where the average person can make certain reactions in four tenths of a second, he requires five tenths or more. A difference of this magnitude may be critical in some traffic situations. The matter is called to his attention and he is shown the actual results of the test. Then he is cautioned: it is pointed out that he has this handicap which makes him more apt to have accidents than the ordinary person, unless he makes allowance. It is further pointed out that some people with a handicap who know about it are able to compensate by greater caution—for example, there are some one-legged or one-armed automobile drivers who are just as safe as anyone because they realize their limitations and never get into a situation where emergency demands will arise. Our man with the slow reaction is told that if he comes up to an intersection as people ordinarily do, and an emergency rises which calls for a very quick response on his part, he just won't be able to make it and will get hit. If, on the other hand, he takes unusual precaution in approaching an intersection and never lets himself get into a situation where it is going to be necessary to respond quickly, then he may get through the rest of his life without an accident. If this matter is put up to him vigorously enough and he has sufficient insight into the situation, he may deliberately exercise the necessary caution and be as safe a driver as anyone. Proposals have been made to put such a person on probation with an operator's license of a different color and the understanding that if he does not observe due precaution and has another accident, he will then lose his operator's license. There have been indications that drivers who went through a traffic clinic of this sort and received the appropriate advice, did have a better subsequent record. Such data, however, should be interpreted with some caution because if the initial group was selected because of a bad accident record, they would be expected on the basis of mere probability to have somewhat fewer accidents subsequently. It would be desirable to have a control group with about the same initial accident record that did not go through the clinical procedure.[65]

---

[64] Shellow, S. M., "The Accident Clinic, How It Functions and What It Accomplishes," *Personnel Journal,* 1930, 9, 207–215.

Education and Publicity

A final aspect of accident reduction involves voluntary effort on the part of the worker. This includes education on hazards and publicity about safety. A frequent problem is inducing the worker to use the safety devices which the engineers have provided. If goggles are furnished for tool grinders, some workers are inclined to take a chance on a short job and not bother with the goggles. Similarly, if there is a guard on a circular saw which must be adjusted according to the height of the stock, the adjustment seems unnecessary for a very brief cut. Publicity to induce persons to use these safety devices is in point. Another problem is to persuade them to play safe in general and not cut corners—to take time enough to do a thing properly. This goes back to the matter of attitudes.

---

[65] Johnson, H. M. and Cobb, E. W., "The Educational Value of Drivers' Clinics," *Psychological Bulletin,* 1938, 35, 758–766; also DeSilva, H. R. and Channell, R., "Driver Clinics in the Field," *Journal of Applied Psychology,* 1938, 22, 59–69.

These problems lie somewhat in the field of selling and advertising. After all, it is possible to sell safety just like a commercial product (Chapter 22). One of the first considerations is attracting the workers' attention to the publicity material. Posters of large size, for example, get more attention than small ones. A little notice on the bulletin board is not as insistent as a poster several feet long. Color is also effective. Pictures help, especially pictures of people, and moreover they can illustrate the selling point. They also tell their story in brief compass if they are designed to portray the hazard clearly.

Once the attention is attracted to the poster or the display, there is the question of what particular appeal or inducement to use in getting the workers to play safe. A common one is fear. Many persons can be frightened into using a safety device or being careful by the simple expedient of showing vividly what may happen to them otherwise. On one bulletin board there appeared a small bottle of formaldehyde containing an eye with an explanatory legend to the effect that this eye belonged to John Doe and if he had worn his goggles he would still be wearing this eye. For a period thereafter, all the goggles were worn regularly. A frequent device is a dramatic picture of someone getting hurt in a way that might have been avoided, for example, getting the clothing caught in the machinery, lifting objects in the wrong fashion so as to induce muscular injury, or having things drop on feet that are not protected by safety shoes. Fear is a negative type of appeal which is not always appropriate, but in the accident field it is quite successful.

Another motive is competition with reference to safety. Records are kept and posted, and the individual or the department with the best record gets some kind of recognition or prize. Some construction crews in the electrical utilities have a plaque on the truck indicating that they have gone through a certain period without accidents. If, however, competition is used in this way, steps should be taken to insure that the workers do not confuse means with ends. In a British mine some special recognition was to be given to the group which had the smallest amount of lost time due to accidents. One miner broke his leg and his colleagues carried him down the shaft every day, checked him in officially, parked him there during the day and checked him out at night. Thus, as far as the records went, there was no time lost for his group because of his accident. The workers evidently missed the real objective of the project.

Materials are available from various safety promotion organizations in the way of pamphlets and posters. Some industries devise their own material or organize safety committees of the employees themselves. Such committees study hazards to try to eliminate them as well as work on the safety attitudes of their fellow-employees. It is a good idea to analyze the accidents before a publicity campaign with a view to determining just what are the main sources so that the campaign can be planned systematically. It is undesirable to try to do everything at once. Some organizations have found it profitable to take one hazard at a time. They concentrate on unsafe tools with cracks in the handles for a week; the next week they talk about safe clothing. One campaign was organized around, "Eleven Ways to Break Your Neck," with pictures illustrating the eleven possibilities. Breaking down the publicity into these units has the advantage that each item is presented at a higher level of attention.

The safety movement extends outside the factory to the home and the automobile. A useful motive in the latter case is not merely fear of getting hurt, but fear of enforcement agencies. If numerous officers on motorcycles are visible, people are more careful than if they feel that they have the road to themselves. Conspicuous markings at hazardous places in the highway help. Some states, on occasion, have put a white cross at every point where a person has been killed in a traffic accident. Psychologically these are effective reminders of the hazard.

Education along lines of safety is being extended into the schools and even into the pre-school years. The initial objective is safe pedestrian habits when crossing a street. Later, when the youngsters begin to drive the family car, it should become "smart" to drive safely. After all, many habits and attitudes of childhood carry over into the adult years and habits and attitudes regarding safety may be included.

Summary

Continuous work may result in decreased production or increased feelings of tiredness. The two do not always coincide. In its physiological aspects fatigue is due primarily to exhaustion of energy-producing material such as glycogen and to the accumulation of waste-products in the organism. Mental fatigue does not differ significantly from physical fatigue except in the comparative rate of decrement. It is not profitable to draw too sharp a line between mental and physical fatigue, and measures designed to minimize one will help with respect to the other.

It is desirable to have some technique for indicating the course of fatigue during a day's work in order to determine the effectiveness of remedial measures. Although many laboratory procedures have been investigated, there is no universal index of fatigue, and many investigators fall back upon diurnal production records as the best indicator. The typical trend is an initial warming-up, then a leveling off in the work curve, and finally, a drop as fatigue becomes pronounced. It is possible also to compute the decrement in production in two successive periods of a spell. Another possible indicator is increase in accidents through the day.

Technical adjustments for eliminating unnecessary fatigue are pertinent. Other possibilities include: reduction of postural fatigue by means of seats and the adjustment of the height of the work to the stature of the worker; mechanical devices which substitute mechanical for human power; minimizing clutter in the work place; reducing unnecessary vibration which causes incipient muscular adjustment; and grading the tools according to the type of work to be done.

Other remedial measures lie in the temporal aspects of the work. In some extreme cases shortening the working day produced an increase not only in hourly production, but in daily production. This was because prior to the change the Monday night rest was inadequate to get the individual back to normal, so that the fatigue accumulated during the week. There is an obvious limit to this procedure from the standpoint of over-all efficiency, but theoretically the optimal length of the working period depends upon the type of work. It is found, sometimes, that the benefit from the reduced working period does not result immediately but takes several weeks before production reaches its ultimate level. The worker has established habits of saving himself for the long grind and it takes a little time for him to adjust to the new schedule.

Theoretically, rest pauses should be superior to a shortening of the working day. If a pause occurs before much fatigue has accumulated, a relatively short pause suffices, and the worker can be kept at something like maximum efficiency throughout the day. Various studies have shown notable increases in efficiency as a result of systematic installation of rest pauses. Although workers take some unauthorized pauses anyway, it is more effective to have the schedule arranged scientifically. Experiments indicate that even when intelligent subjects attempt to set the most favorable arrangement of pauses from the standpoint of their own efficiency, they do not come very close to the optimal schedule that has been worked out scientifically.

The best location for the pause is at about the point where the production curve starts to descend. In fact, it may be possible to put the pause just a bit later than this point, relying on the anticipatory effect of the pause to maintain production for a few minutes longer. The duration of the pause should be sufficient to alleviate the fatigue, but not so long that unnecessary warming-up is required. What the worker should do during the pause varies with the job, but the important point is that it should not involve the same musculature as that required by the job. Here again, the incidence of the improvement is not always immediate and for the same reason. The attitude of the workers toward the pause also has some bearing on its effectiveness. In one instance where workers had to earn the pause, there was an element of uncertainty as to whether they actually would receive it, and production was less than when the pause was guaranteed.

Another psychological by-product of prolonged work is monotony. It is more characteristic of repetitive work, but individuals differ in their susceptibility to it. Some workers are not particularly bored by their job because of their low intelligence. For another type of individual the job occupies his attention fully even though he has normal intelligence. Still others adjust to the monotony by dividing their attention between the task and some mental elaboration of it, and others do the task automatically and think of interesting things in their outside life. However, some people are definitely bored by the job. Some of these accept the situation philosophically and count on the outside pleasures which can be purchased with the money they are earning. Others cannot make any adjustment of this sort and are simply maladjusted and unhappy.

It is desirable to have some indication of the presence of monotony, quite apart from the worker's own statement about it. Diurnal production curves show a drop in the middle of the spell followed by a subsequent rise due to the anticipation of the end. There are indications also that variability in production may indicate monotony.

It is desirable to measure susceptibility to monotony in advance of actual employment. Intelligence tests show some promise for this purpose. Another possibility is comparative rate of decrement in simple repetitive laboratory tasks like putting a stylus in holes in a plate following first a very simple pattern and then a more varied pattern. Time estimation is not a sufficiently consistent indicator to be useful.

One way to alleviate monotony is to assign employees on the basis of tests like those just mentioned. Another possibility is to make the work itself more interesting by putting it in a wider setting and telling the worker more about the relation of his job to the whole product. For those persons who adjust themselves to monotony by thinking of interesting things while working automatically, the encouragement of outside interests will help. It may be feasible to introduce a change of work—for example, letting two workers on a team change places. Too many alternations, however, reduce efficiency. Moreover, the alternation is most effective if the jobs differ moderately, so that there really is some change, but not so great a change that much warming-up is necessary. Rest pauses may be helpful too, with reference to monotony.

Some unnecessary industrial accidents can be traced to psychological factors. A small proportion of the workers may have a large proportion of the accidents, and it is possible to identify accident-prone individuals. Aptitude tests, using accident record rather than production as a criterion are helpful. Tests of coordination and reaction time have shown some promise along these lines, but the relation of intelligence to accident susceptibility is equivocal. Numerous psychological tests have been validated with reference to accidents in automobile driving. Many of these center around reaction time, emotional stability, coordination, and judgment of distance and speed. Another psychological source of accidents lies in the field of attitudes—such as recklessness or carelessness. The approach here is the indirect type of objective personality test. Such tests are still mostly in the research stage.

In addition to the more fundamental innate factors, there are other characteristics predisposing to accidents which may be modified by training. A person may need a certain minimum skill in an operation before he can be trusted on his own. Mere ignorance about hazards, lack of adequate information, or misunderstanding of directions are contributory factors. Alcohol may be a cause by virtue of the fact that it decreases alertness, slows down responses, increases variability of performance, and produces an illusory increase in self-assurance. Factors contributive to accidents also include fatigue, inadequate illumination, and poor ventilation. Emotional states are disorganized and inefficient and may lead to accidents. Emotions may arise because fellow-workers torment the individual, or may carry over from some conditions outside the plant, such as domestic difficulties. The foreman may be able to locate workers who are in an emotional condition and do something about it.

Another approach to the accident problem is clinical in nature. A group of experts, including a psychologist, go over the accident data and attempt to discover just why the employee had the accident and to make a prognosis. Sometimes the employee has an unfortunate habit which can be corrected so that he becomes a perfectly safe worker. A similar clinical approach has been made with drivers of vehicles. The clinic points out some definite shortcoming for which he may compensate during his driving and get along safely thereafter.

The final aspect of accident prevention involves education and publicity to induce workers to try to be careful. The fear motive is effective in this way by showing the person the unfortunate consequences of carelessness. Another motive is competition and some prize or recognition for a good safety record. Promotional material along these lines is available from national safety organizations.

21

MORALE

Morale as it operates in industry may be considered as the tendency of employees to work together enthusiastically for a common purpose. The first aspect of this definition involves team work and cooperation between workers and supervisors. The enthusiasm comprises zest, *esprit de corps,* and the absence of apathy. The common purpose implies some goal on which they all agree and toward which they are working. A basic psychological principle, which operates in many morale situations, is the tendency for feelings or emotions aroused by one thing to spread to something else. Everyone has had the experience of an insult or a bit of bad news spoiling the whole day, or of the discovery of five dollars in the old trousers creating a euphoria which persisted for hours. This tendency for emotions to attach themselves to something else that occurs along with the real cause of the emotion is basic. In the industrial situation some little unfortunate experience with a supervisor or some unpleasant thing in the working conditions may spread and color the worker's entire attitude toward his job. Many times, a thing that appears trivial creates quite an emotional disturbance because of this expansion in emotional attachments.

Importance

Little need be said about the importance of morale. In the military situation it is quite obvious. When the going is tough and the men are hungry, tired, wet, and cramped, their general morale may make the difference between keeping on or going in the other direction. The termination of hostilities in 1918 was greatly facilitated by the break in German morale. During the second war, the conduct of civilians in England at the height of the blitz was an instance of what morale can do in a positive way. An important result of good morale in industry is that the workers will ride through some critical situation with reasonable equanimity. They may take a more or less "wait and see" attitude. For example, a new technological development in the textile industry necessitated considerable transfer of individuals and even, in some cases, demotion. However, the technological change was one which was so obviously in the interest of efficiency that it had to be made. Some plants had a lot of trouble as a result, whereas those with a considerable backlog of good will rode through the period reasonably well. The employees were willing to try the new arrangement and see what the ultimate result would be.[1] There have been numerous instances in which some comparatively small thing upset morale because that little thing fitted into an already unsatisfactory situation. If, on the other hand, the soil is not prepared for these little irritations to take root, the workers pass through the period without difficulty.

There has been, of late years, an increasing realization that satisfaction makes for efficiency and that the contented worker is a more efficient worker. In the earlier days the philosophy of industrial management was to provide better operational methods and additional incentives so as to induce workers to put out as much effort as was humanly possible. This procedure disregarded many of the other human elements in the situation, particularly the employees' attitudes. Now, management is coming to realize that these are of equal importance, and industries are giving careful consideration to the morale problem. Some of them have employee relations departments which devote their main effort to just this sort of thing.

Surveys on Satisfaction and Morale

A brief glance at industries indicates that appreciable numbers of employees are dissatisfied, and that morale, therefore, is a very real problem. In Philadelphia, for example, five major groups of employees in trade, clerical work, transportation, public service, and manufacturing were interviewed, usually by persons who knew them, on general liking for their work. Out of this sample 65 per cent liked their work but 35 per cent disliked it.[2] This proportion of dissatisfied workers certainly is disquieting. Other studies indicate that the incidence of dissatisfaction depends on the occupation. In one sample of 273 men 86 per cent of the professional men were satisfied with their work, 74 per cent of those in managerial positions, 42 per cent in the commercial group, 56 of the skilled, and 48 of the semi-skilled. Descent of an occupational scale based on the social status of the occupations revealed an increasing degree of dissatisfaction.[8]

---

[1] Smith, E. D., "Lessons of the Stretch-Out," *Mechanical Engineering,* 1934, 56, 73–80.

[2] Cole, R. J., "A Survey of Employee Attitudes," *Public Opinion Quarterly,* 1940, 4, 497–506.

Another approach was made by interviewing 250 workers on what they considered the most important and the least important matters of policy in the concern where they worked. They were asked further which of these policies were the best carried out. A portion of the results is given in Table 39. The entries in the table are the per cent of workers in the class indicated at the head of the column who consider the policy indicated at the left of the row as most important or best carried out, as the case may be. For instance 13 per cent of union workers listed "voice in management" among the most important policies. Some trends in the table are of interest. Steady employment is ranked high by a large proportion of both union and non-union workers. Amount of pay and working conditions are mentioned frequently by both groups. Adjustment of grievances, however, is listed as important by a large proportion of the union workers and a much smaller group of the non-union. The last two columns indicate what the employees consider to be the best carried out policies. They think that safety procedures are carried out fairly well, although they do not consider safety policy relatively as important. On the other hand, the actual policy regarding pay does not receive their com-

TABLE 39

Workers' Judgment Regarding Personnel Practice *

	Most Important		*Best Carried Out*	
	Union	*Non-Union*	*Union*	*Non-Union*
Voice in Management	13	6	3	9
Adjustment of Grievances	80	24	52	23
Chance of Promotion	28	47	18	18
Steady Employment	65	93	50	55
Medical & Dental Service	—	6	3	32
Safety	57	21	79	53
Pay (Amount)	49	51	9	6
Working Conditions	49	45	50	55
Hours	13	23	38	29
Supervisor	18	38	15	6
Method of Pay	—	2	21	15
Insurance and Pensions	18	36	12	89
Chance to Show Initiative	5	6	6	—

* Hersey

---

[8] Super, D. E., "Occupational Level and Job Satisfaction," *Journal of Applied Psychology,* 1939, 23, 547–564.

mendation at all although they list it as of considerable importance. Discrepancies between union and non-union workers in the table may be due to actual differences in basic attitudes of those who join and do not join. On the other hand, they may result from the fact that certain things have been done in union establishments which have not been done in the other establishments. At any rate, the table does indicate potential sources of good or bad morale.[4]

A study in a department store brought out the disquieting fact that management was not aware of what the employees thought about various policies. The things which management considered important were not the ones which the employees so regarded.[5] Each group was asked to indicate the relative importance of various personnel policies. The employees in four stores rated job security well down on the list, whereas executives placed it at the top. Proper evaluation of the work was rated highly by the employees, but well down on the list for the executives. In one store understanding and appreciation of the workers was rated as most important of all by women employees, whereas this was given only an average rating by the managers. The conclusion from this investigation is that systematic efforts should be made to explore employee attitudes rather than assume that management can tell just how the workers feel about things.

A study discussed earlier in connection with incentives (page 496) brought out the fact that security and advancement were sometimes of more significance even than wages. It sometimes develops that complaints about wages do not reflect the actual facts, but that the wage is a symbol of resentment against other conditions which are somewhat emotionally charged.[6] The over-all picture indicates that an appreciable number of workers are dissatisfied for a variety of reasons, and it is desirable to analyze these sources of dissatisfaction and see what can be done about them.

Measurement of Morale

Need. If anything is to be done about morale, some method of measuring it is needed in order to determine if supposedly beneficial procedures have been of any value. If morale initially is at a certain level, some feature may be introduced which should improve it, and then morale may be checked again to see if there has been the hoped-for improvement.

---

[4] Hersey, R. B., "Psychology of Workers," *Personnel Journal,* 1936, 14, 291–296.

[5] Employee Relations Bureau, National Retail Dry Goods Association. "Your Employee Wants to Know," *Personnel Journal,* 1939, 17, 357–363.

[6] Seidman, J. N. and Watson, G., "Satisfaction in Work," *Journal of Consulting Psychology,* 1940, 4, 115–120.

Ideally, everything else should be kept constant, just one factor should be varied, and morale should be measured before and after. Another possibility is to take two groups, or departments, or factories that are known to differ in certain variables which might influence morale, and apply some measurement in those two situations. There would be some presumption that the particular factor under consideration had been effective if the group possessing it showed a higher morale index than did the group which lacked it. Theoretically, it should be possible to separate some of the other variables that might cut across the relationship by the technique of partial correlation, although this has seldom been done. Again, if different groups of workers show markedly different scores on the morale index, it is pertinent to explore the factors that might have caused that difference. Any of these procedures, however, necessitate some measurement or index of morale.

Attitude scales. Considerable experimental work has been directed toward the development of attitude scales as procedures for measuring morale, like those discussed briefly in Chapter 5 (page 98). In general, they consist of statements which are checked anonymously by the employees according to their agreement with them. Typical statements are "This is the best place I ever worked," or "An honest man never has a chance in this company." A worker who checked the former and omitted the latter would presumably have better morale than one who checked the latter but omitted the former. These statements are evaluated so that each statement has a specific score or scale value. The statements are considered as ranged along a straight line or *continuum* with favorable statements toward one end, unfavorable toward the other, and the moderately favorable in between. The distance of any statement from the end of the line indicates its scale value.

The items or statements for making up an attitude scale of this sort are obtained by soliciting them from personnel people, interviewers, and supervisors. Casual statements made by workers when they were talking informally to management or even in systematic interviews sometimes are pertinent. Where an organization has a regular employee interviewing program, the interviewers may be able to suggest statements that are related to morale. If some causes of poor morale are known, they suggest items for the attitude scale.

The most widely used attitude scales involve items that require categorical answers. It is possible, however, to use something of the order of a multiple-choice form:

"Are there any other concerns in this city in which you would rather work if you could get a job for which you feel equally qualified at the same salary?"—

I would rather work in any of the others; I would rather work in almost any of the others; a few of the others; one of the others; none of the others.

Or again:

> "If you've ever been dissatisfied with your job here, how often was it the plant's fault?"—in practically every case; considerably more than half the time; about half the time; it was hardly ever the plant's fault; I have never been dissatisfied.

An arbitrary value is attached to each alternative. The five alternatives on a given item are considered as distributed along a *continuum* after the manner of the categorical statements.

It is often helpful when casting about for items to include in attitude scales for industrial use to have in mind certain topics or categories which may be sampled. Some such topics, with illustrative items at each extreme are the following: (1) *company policy:* "This company gives everyone a chance," or "You never get credit for anything"; (2) *working conditions:* "The department would be a lot more comfortable if they fixed it up," or "Working conditions are about as good as you'd find anywhere"; (3) *nature of the work:* "This work is monotonous and uninteresting," or "I get quite a kick out of this job"; (4) *foreman's attitude towards the workers:* "Most of us feel that our foreman doesn't care whether we like what he does or not," or "All that anyone asks in this company is that the man does as well as he can"; (5) *foreman's ability to give instructions:* "We often wonder what is expected of us," or "Workers are properly told how they are to do their work"; (6) *foreman's ability to plan work:* "Our foreman often expects more work than it is possible for us to do," or "Our foreman plans the work so that little material is wasted"; (7) *possible irritation between foreman and workers:* "Our foreman is fair and square in dealing with his men," or "Our foreman has the wrong idea about me"; (8) *general over-all statements:* "I'd quit if it wasn't for my family," or "I don't believe I could do any better on a job than right here." The foregoing are typical of some of the topics that are sampled in developing items for industrial attitude scales. It is not difficult to secure an adequate assortment from which to make selection.[7]

Special mention should be made of one technique that sometimes is useful in attitude scales. It is analogous to the projective techniques discussed earlier in connection with clinical psychology. An individual may hesitate to state exactly how he feels about some aspect of the work or about his boss for fear the latter will be informed of the statement. However he may be inveigled into stating how he thinks the other workers feel about it. In this way, he actually does not stake his own reputation, but nevertheless projects his own attitudes into the situation. Some such statements were included in the examples just given—"Most workers feel. . . ." The respondent does not actually say how he feels, although it is probable that the way he marks the statement reflects his own attitudes.

---

[7] See Gibbons, C. C., *The Indirect Objective Measurement of Personality with Particular Reference to the Selection of Foremen.* Ph.D. Dissertation. Ohio State University, 1942; also Woods, W. A., "Employee Attitudes and Their Relation to Morale," *Journal of Applied Psychology,* 1944, 28, 285–301.

Determining scale values. The crux of the matter in developing attitude scales is to determine the score or scale value for each statement. This requires the judgment of experts, that is, persons familiar with morale problems and employee attitudes. The experts are asked, essentially, to locate these statements on the *continuum*. One of the best ways to do this is by the paired-comparison technique. If there are ten statements, each one is compared with every other one, and the expert merely states which of the two indicates a higher degree of morale for every comparison. Each statement has an equal opportunity to be chosen, so it is actually a matter of counting votes. A statement which was picked seven times is better than one which was picked five times. These frequencies of selection are recast by appropriate statistical technique into terms of normal frequency distribution curves, which is the accepted procedure for assigning scale values. The final result is a particular number or scale value for each statement.[8]

Much rougher procedure is used in some instances. Each statement is assigned a value from 1 to 10 by each expert. A rating of 10 might mean that a statement was as favorable as it possibly could be, whereas 1 might mean that it was as unfavorable a statement as could be phrased in respectable English. The average score or weight assigned to each statement by the experts is taken as its approximate scale value.

A few typical statements with their scale values may be given by way of illustration.[9]

9.1	I wouldn't change jobs with anyone.
8.7	Our supervisors are capable men.
6.6	Working conditions aren't so bad.
5.3	There's nothing the matter with the job here, but I am worried by some conditions outside my line of work.
4.3	Sometimes credit is given for good work here and sometimes not.

---

[8] See Edwards, A. L. and Kenney, K. C., "A Comparison of the Thurstone and Likert Techniques of Attitude Scale Construction," *Journal of Applied Psychology,* 1946, 30, 72–83.

[9] Woods, W. A., "Employee Attitudes and Their Relation to Morale."

2.3 It doesn't pay to work hard for promotion, for there aren't any opportunities anyway.
1.5 Political pull rather than training makes for advancement here.
.7 The work is so monotonous I am glad to forget about it after quitting time.

There is no fixed rule about the length of an attitude scale. One consideration is how many items the employees will be willing to check anonymously. It usually is desirable to get the scale reduced to a single page, but, on the other hand, a larger sample of items will increase the reliability.

Such scales have been filled out by employees with interesting results. In one sample of 4,000 employees with a scale of about fifty items, distribution curves were plotted for various subgroups. The scores for the foremen were appreciably higher than those for the regular factory workers, with the office personnel in between.[10] A possible interpretation is that the workers who were more cooperative and had more favorable attitudes were the ones who received promotions to supervisory positions or, perhaps, the persons in those positions had such status that they derived more satisfaction from their work and had better morale.

Interviews as indicators of morale. Another method of securing information about morale is to interview employees. A smaller number of persons can be reached in this way, so there are sampling problems. However, there is some advantage in the flexibility of the interview. It is possible to follow up leads that arise and, in addition to getting the desired over-all index of morale, the interviewer may uncover unsuspected sources of good or bad morale. Some concerns have been quite successful with interviews of this sort. It takes a while to build up the belief that the interviews really are kept confidential. At the outset a worker naturally hesitates to say anything unfavorable about his boss because he fears that his remarks may get back to headquarters and result in retaliation. After an interviewing program has been in progress for a while and the workers find out that their confidential statements really are kept confidential, they speak more freely, and the interviews are that much more valuable.

If exit interviews are conducted there is no difficulty about reticence. The employee will tell all—in fact, his statements may have to be discounted somewhat. Sometimes glaring shortcomings of management are discovered in this way. Incidentally it sometimes is possible to correct the difficulty on the spot so that the employee does not exit after all.

Rapport is important in conducting industrial interviews just as in many other interview situations. This may be obtained by a little initial chatting with the interviewee to get his confidence and establish a friendly relationship. When the actual matters in which the interviewer is really most interested are approached, some topics have proven satisfactory as openers. It is common practice to ask the worker what he considers the best and the worst things about his job, that is, what he really likes or dislikes about it. Another possibility is to ask him for suggestions for improving his job or the situation in which he does it. He may be asked how he would like to change his job. Projective techniques sometimes are helpful. The interviewer asks if there are any things that seem to be worrying the other people in the department. This does not require the worker to tell what disturbs him personally, but if there is a disturbance, he can impute the complaint to the other workers and actually register his feelings without any personal commitment.

---

[10] Uhrbrock, R. F., "Attitudes of 4,430 Employees," *Journal of Social Psychology,* 1934, 5, 365–377.

Such interviews, on occasion, use nondirective techniques like those discussed in connection with clinical therapeutic interviews. It is desirable to let the worker talk, rather than have the interviewer ask a standard series of questions. In this way it is possible to pick up outside as well as inside factors that upset morale. Some of this shades over into individual diagnosis. If factors turn up which are beyond the control of the organization, it is worth while to know about them. A skilled interviewer also gets useful information quite apart from the actual content of the interview itself. He notes how he is greeted by the interviewee, especially if he has talked with him before. The actual inflection of the voice may reveal some tendency that is not revealed by the words. Reticence or willingness to talk may likewise be diagnostic. If morale is good, the worker is glad to talk about his job, but if things are bothering him he is more inclined to close up.

It should be mentioned in passing that even this type of exploratory interview may have certain therapeutic value. Sometimes it helps an individual simply to get a worry or a complaint out of his system. If the worker, in the course of this interview, gets things off his chest, that in itself may improve his morale. Sometimes merely having a sympathetic listener who shows interest in learning about the things that bother him will go a long way toward the elimination of those bothers.[11]

An interesting method of deriving a morale index was used in one instance where the employees selected from a list what they considered the four most important managerial policies, the four most irritating, and those that were best carried out. These selections were obtained in interviews but could be secured by means of a questionnaire. The hypothesis was that if, in a given department, the policies which were considered the most important were also the best carried out and the least irritating, morale was good in that department. An arbitrary scoring system was worked out on the following lines: 10 points were given every time one of the four best carried out policies coincided with one of the four most important; -10 points were assigned when one of the most important was also the most irritating; intermediate values were arranged for different combinations. The total of these indices gave the over-all rating for the department and yielded a wide range of scores when applied to eight departments in one plant.[12]

---

[11] Roethlisberger, F. J. and Dickson, W. J., *Management and the Worker.* Cambridge, Mass.: Harvard University Press, 1939.

Objective criteria of morale. In addition to attitude scales and interviews, there are a few objective criteria that throw light on the level of morale in an organization. If production is considerably lower than that of which the workers presumably are capable it may be that morale is below par. Or if production begins to drop either in quality or quantity, perhaps morale is slipping too. Absenteeism is a second possible indicator. If people dislike their job, they are more inclined to stay away. However, it is necessary to make allowance for other causes of absenteeism such as health, or inadequate facilities for care of children where both parents work, or housing shortage, or transportation difficulties. If such factors are under control, an increase in the absentee rate suggests that something is happening to morale. A third indicator is lateness in arriving at work. If a person really likes the job, he tries to get there on time. Loafing is a fourth factor. If the work is disagreeable, doing less work means less disagreeableness. Fighting or general discord among the workers is a fifth index of unfavorable attitudes. If they dislike the job, they may come to dislike each other. A sixth possibility is poor housekeeping. Finally, agitation and frequent complaints which seem out of proportion to the actual causes serve as indicators. These objective factors throw some light on the general level of morale, although they do not yield a quantitative index. The best technique for securing such an index is the attitude scale.

Management and Morale

It is a mistake to attempt to apply some cure-all uncritically without analysis of the actual difficulty, in attempting to raise morale. On occasion a concern with an undue amount of grievances decides to paint the walls white so as to "make them happy," without really going into the causes of the grievances. Although the cheerful atmosphere may help morale somewhat the management may be overlooking some more basic consideration. Although there is no universal factor which lowers morale, a considerable number of variables have come out of interviews, questionnaires, and scales that apparently have contributed to the problem. A systematic classification of these factors is difficult. One possibility is a threefold division into (1) factors in employment relations; (2) factors in the individual; (3) factors outside the plant. The first of these three divisions is by far the most extensive. It may be subdivided into (*a*) direct contact with management, primarily with the immediate supervisor; (*b*) physical surroundings and working conditions; (*c*) contact with fellow-workers—social relationships; (*d*) imitation and suggestion from fellow-workers or elsewhere; (*e*) emotional factors arising from contacts with fellow-workers or others. The second major division—individual factors—includes such things as aptitudes, age, sex, health. The third division—outside factors—includes home conditions, recreation, and adult education.[18]

---

[12] Hersey, R. B., "Employees Rate Plant Policies," *Personnel Journal*, 1937, 16, 71–80.

Initial impression and reception. The importance of first impressions—a new acquaintance or a new town—is familiar to everyone. It is equally important with reference to a new job. The impression that an employee receives in the process of being hired and inducted may color his attitude toward the organization for a long time to come. There are important considerations in the mere physical set-up for employment. If the employment department is difficult to find, the worker is disgruntled or embarrassed at the necessity of asking someone for directions and revealing the fact that he is unemployed. A clearly designated employment office in a convenient accessible location will help. The worst installations lack a waiting room, and the applicants simply mill around in the hallway, or there is a bare room, with no seats. Some concerns interview applicants through a hole in a glass window, or, worse still, an opaque window is opened once in a while, and someone talks to the applicants nearest to that window. Perhaps the foreman does the hiring and merely opens the gate slightly and looks them over, as they are standing around in any kind of weather. On the other side is the comfortable waiting room with plenty of chairs and reading matter. Physical relaxation is much more conducive to a favorable attitude and an effective interview than is the tension produced by standing, or walking around, or sitting on a window sill. A cue may be taken on this point from complaint departments with their extra-comfortable waiting room for the clients with overstuffed furniture and artistic surroundings. The complainant relaxes and, by the time he is interviewed, has cooled off so that the difficulty is smoothed out easily. By the same token, a prospective employee who is physically comfortable while waiting develops a better impression of the place right from the start. Incidentally, long waits should be avoided if possible.

---

[18] For similar classifications see Kornhauser, A., "Psychological Studies of Employee Attitudes," *Journal of Consulting Psychology*, 1944, 8, 127–143.

Another important aspect of this initial impression is the interview itself. Sitting down and talking man-to-man across a desk goes farther toward the development of favorable attitudes than does standing up and talking through a window. The writer recalls one place that had the window arrangement, and when he inquired how it worked, was informed, "If the girl can't get rid of them, Mr. Blank does." This happened to be at a time when few employees were needed. But the objective of getting rid of them overlooked entirely the fact that this was an industrial community, and the attitudes carried away by applicants would have a good deal to do with the standing of that concern in the community in the years to come. A good employment interviewer makes an effort, even if he does not hire the man, to leave him with the impression that this would have been a good place to work. Thus the applicant carries favorable attitudes back into the community. A general attitude of friendliness, an appearance of being glad to talk to the person, willingness to explain details about the proposed job as well as to find out whether the applicant meets the qualifications, all contribute to building good will on a permanent basis. This initial interview should make special effort to give the applicant adequate information. The worst procedure is to hire a man without even telling him what he is going to do until he reaches the foreman. He should be informed about the nature of the job and its future possibilties. He should also be adequately informed about hazards and annoyances in the job so that he takes it with his eyes open. He needs information about the relation of this job to the other products made by the concern; he needs to know about fire signals, sanitary facilities, safety, and various rules. Some concerns go so far as to have an actual handbook for a new employee with the title: "What Do You Want to Know?" It tells him what the concern has to offer—insurance, vacations, pensions, lunch facilities—and indicates what the organization expects of the worker. An employee who is well-informed is not unfavorably surprised later and does not feel that he is the victim of misrepresentation.

The final aspect of the initial impression is the procedure followed in actually making contact with the foreman and beginning to work. In some cases, unfortunately, the man is merely given a ticket and told to go to a certain place or perhaps escorted by an office boy who is not expert in industrial relations. It is much better if some minor executive, possibly the interviewer himself, conducts the new man down to the department where he is to work. On the way down, they chat about some other aspects of the job and certain facilities are pointed out en route. The new man is introduced to the foreman, and the latter shakes hands with him, and appears glad to see him. Just a little personal interest at this time goes a long way. Someone has described this attitude as "guest foremanship," that is, the new man is received with somewhat the same attitude with which a guest is received in the home. The foreman will do well to greet him daily, preferably by name, so that the man feels that he belongs even in the very early stages of his connection. The foreman, likewise, should see that he gets acquainted with his fellow-workers. Some concerns go so far as to have a sponsor system. One of the older employees, who may be paid for it, takes a sort of "big brother" attitude toward the new man in his first few days. The sponsor, apparently by accident, happens along at lunch time, and they go together to the cafeteria. Here, effort is made to get the man acquainted with some of the others, and if there is some recreational activity during a portion of the lunch period, he can be drawn into that orbit. Thus, if the applicant receives a human reception in a congenial setting, gets inducted into the actual job in a friendly atmosphere, and becomes acquainted with his fellow-workers, he has built up a favorable reserve of morale already.

Supervision—we attitude. One of the most important factors in the average employee's morale is the first line supervision which he receives. The foreman, or his equivalent, is the representative of management with whom the worker is in most frequent contact, and their mutual attitudes at this point may be critical. For one thing, it helps a lot if the foreman has what someone has called a "We attitude." This means that he works with the men instead of simply ordering them. One foreman expressed it that he would rather have 10 men with him than 50 men under him. It is analogous to the captain of the team who calls the signals but also carries the ball, runs interference and, in every way, participates. As one worker put it in an interview, "Our new foreman gets 25 per cent more work from us by leading us instead of driving us like the old one." It is often a matter of selling his orders to the workers so that they cooperate willingly. For example, the foreman of a gang of millwrights was confronted with a situation in which a sudden change in some orders which had been received necessitated getting the men back Saturday afternoon and maybe Sunday, to change around some shafting. He approached them along this line, "They want us to change this shafting around over the week end while the plant is shut down. Do you think we can do it?" (Emphasis on "we") Some of them immediately said yes and pointed out certain parts that would be needed. They did this in spite of the fact that they had been set for Saturday afternoon picnics or fishing and had to make a major change in their plans. If the foreman had simply ordered them to come back Saturday afternoon or else, although they might have done so, it would have been much less willingly and this incident might even have been a last straw. Again, a manager showing a visitor around the plant, introduced him to the operator of the elevator, and pointed out that "John and I have been working here together for a good many years. He runs the elevator and I run the plant." Another foreman was confronted with the fact that a slight reduction in the group bonus resulted from the necessity of adding a man to the group to take care of an especially high quality order. Instead of merely telling them to get going if they wanted a larger bonus, he explained the situation, said it worried him as much as it did them, and asked if they had any ideas for distributing the work so they could dispense with the extra man and still achieve the necessary quality. One of them shortly came up with a suggestion for moving some controls which achieved the result. The foreman actually took them into his confidence and sought their help on a problem of common concern. In another case where the employee was spending undue time in sorting certain cards in a tote-box, the foreman saw a better way which he could have told the man to use. However, he said instead, "You and I ought to figure out a better way. Why don't you give it a little thought?" This approach smacks of the nondirective interview discussed in an earlier chapter. The foreman leads rather than drives and cooperates with the persons under his charge as though he were one of them. This does not mean that he lets them ride him, because he still is in authority, but a moderate amount of this "we attitude" may go a long way toward improving morale.

Inside information. People dislike to work blindly and prefer to know why they are told to do certain things. Therefore, a little inside information about what is going on and why certain things are done creates a favorable attitude. A foreman took a group of men out into the factory yard and had them dig a hole about three feet deep. Then he had them fill it and dig another hole a few feet distant. He then told them to fill this one and dig a third. At that point they quit. If he had merely told them that he was trying to locate a water main, the difficulty would not have arisen. However, digging holes in aimless fashion was a little too much for them. The foreman should avoid last minute announcements about working over the week end or working overtime when it can possibly be avoided. If the workers see it coming and have to make some readjustment of their plans, they can do so with reasonable equanimity, but if it is sprung, resentment is inevitable. Advance information of anything that may effect the employee's welfare is highly desirable. If changes are in the offing, he should know about them and why they are going to be made. In fact, it is well to consult the employees, if possible, and get their judgment about forthcoming changes. The old foreman's slogan was "Get them young, treat them rough, and tell them nothing," whereas now it might be phrased, "Get them young, treat them right, and tell them everything."

Recognition of accomplishment. A supervisor should give credit when and where it is deserved, and should do it promptly so that the resulting pleasant experience is associated with the right stimulus. It was pointed out in connection with methods of learning, that a correct or a desired response should be followed by satisfaction. A delayed reward does not become as readily associated with the act as does an immediate one. Moreover, if the supervisor steals credit for a new suggestion, he will soon dry up the stream at its source. Recognition of accomplishment tends to build up pride in one's job. If someone asks the window washer how he manages to get windows so clean without any streaks or asks an electrician to show him how to skin a piece of wire, the implication of the worker's competence or even superiority to the questioner in some particular respect promotes a favorable attitude.

Open to discussion. The supervisor should be willing to discuss anything with the workers. Some people put up barriers between themselves and their subordinates so that they are difficult to talk to. This may save valuable time but it does not help morale. If the door is open and the supervisor is accessible, both physically and mentally, so much the better. Even if the employee comes in about a matter which actually is trivial, it may not be trivial to him, at least at that particular moment. An opportunity to discuss it and get it out in the open has the well-known release effect which is so basic in psychotherapy. Another aspect is that if the foreman is inaccessible, workers are more inclined to go over his head, whereas if he is always willing to talk to them, they generally try him first so that a better cooperative attitude develops.

Delicate situations. A foreman has to handle many situations which are sufficiently delicate to be fraught with possibilities of upsetting morale. Many of these situations involve an employee with an actual grievance who initiates the contact and wants something straightened out. On other occasions, some change is to be inaugurated which is in the interest of efficiency but requires some readjustment of habits and will be resented by the workers unless it is presented to them carefully. One point that is important in such situations is emotional control. If either or both parties gets angry, the outcome of the interview is apt to be unsatisfactory. If a man is angry and becomes tense, it tends to accentuate the emotion as noted earlier. If the employee with a grievance comes tearing into the office, one of the first requisites is to get him to sit down and relax, if possible. Just getting his weight off his feet relieves the strain on some of the larger muscles. Smoking has a similar effect with many people. Moreover, if the supervisor himself gets tense, it puts him down to the level of the irate worker. The foreman should watch his own physical posture in the same way. Another thing that helps to calm down an excited person who comes in with a grievance is to get him to tell his story a second time. Quite likely, he laid awake half the night rehearsing, so the matter is now quite emotionally colored. The foreman says, "Now, let's see, I want to get this straight. You said so and so. Let's go over that again." The restatement does not sound as convincing, even to the man himself. Also, in the process, he continues to relax further if he is sitting down. It is difficult to keep up a high level of tension indefinitely. Sometimes, by the time he has recounted his story the second time, he begins to wonder why he was so excited when he came in. Then again, the supervisor should not interrupt too much, but let this be an opportunity for the employee to get the thing out of his system and get the usual therapeutic release. Effort should be made also to avoid stirring up emotions which were not present at the outset of the interview. If the employee's point is ill-founded, it is unwise to rebuff him flatly because that arouses additional emotions. It is better, if possible, to save his face. A supervisor might say, "I would probably have felt the same way if I had only had the information that you did at the time," and then give him the further facts.

A second desirable feature in handling delicate situations is to make a rational approach once the emotional aspect is under control. The supervisor should be objective about it and rise above any personal dislikes. Even though the worker who is complaining is an objectionable sort of a person whom nobody likes, that should not enter into consideration. Moreover, the supervisor should be aware of his own prejudices. Almost everyone has been conditioned to the point where he dislikes people of a certain appearance or social group. If the supervisor is aware of his tendency, then he can make allowances. Moreover, it is desirable to get all the facts before making decisions, and not go off half-cocked. It is well to be open-minded and see the worker's viewpoint or else the worker will put up a fight for his rights. If the supervisor is making an obvious effort to see both sides of the question, he gets much better rapport.

A third desirable feature is prompt action. If consideration is delayed, the worker broods over the matter and probably magnifies it. A slight grievance which does not receive attention festers until it becomes pathological. The supervisor may think erroneously that if he can stall a little, the problem will clear up itself anyway. However, if the supervisor stalls or passes the buck, the subordinate begins to regard him as inferior. The workers should be encouraged to come and "spill" their difficulties if they want prompt action. If they do come in with problems instead of going over the foreman's head, this may be regarded as a vote of confidence. It is better still to discover the difficulties before any complaints arise. If the supervisor is alert for the causes of dissatisfaction, he may do something to forestall trouble before the matter reaches the stage of an open complaint. A supervisor may suspect from the worker's manner when something is wrong. If he detects a little gruffness, or coldness, or preoccupation in his daily contacts, this indicates that something is bothering the worker and perhaps the source can be ascertained.

There are cases, too, where the delicate situation must be initiated by the supervisor rather than the worker. If a difficulty is to be corrected or some change of procedure is necessary, it is well to start with a positive note, and then turn to the critical matter. For instance, a foreman was becoming too much of a slave driver, and it was necessary for his superior to call it to his attention. He did it like this: "We're pleased to see how you are trying to get the most out of your department. You've probably noticed that we don't ride our men, ... Why don't you try it this other way for a week and see how you make out?" If something new is to be installed, it is possible to let the employee "discover" it himself, and feel that it was his own idea. The supervisor discusses the problem with him and if anything is suggested remotely resembling what is wanted, the supervisor says, "There's an idea," and they discuss it further until they come around to what the supervisor had in mind anyway. Another device is to ask the employee for advice. Almost anyone enjoys dispensing advice which he feels competent to give. To that extent, he is superior to the person who is receiving the advice. A typical situation is where a younger man has been promoted over an older one to a supervisory position. This situation is loaded with unfortunate potentialities. However, the younger man disarms the older, and creates a reasonably satisfactory adjustment by frankly admitting his lack of experience in some aspects of the work and expressing the hope that the old-timer occasionally will give him the benefit of his experience. Often this approach takes care of a difficult situation.

Discipline. There is a similar need for supervisory finesse where discipline must be administered. It is a good idea to approach a disciplinary situation with a clinical, as well as a legalistic, attitude. It is not merely a matter of punishing the employee for infringement of rules, but it is important to find the causes that led to this breach of discipline and correct them if possible. Many times the real cause was ignorance, oversight, worry, distraction of attention, or even some compensatory mechanism whereby emotional release was obtained for some other, more fundamental, maladjustment. In other words, the breach may be somewhat of a symptom, just as in school the teacher often finds that an emotional outburst is a symptom of a more fundamental difficulty.

The employee may not be emotional himself at the outset of the interview, but the foreman should be on guard about his own emotions. Physical posture and muscular relaxation are important. It is also well to watch one's voice in that situation and not talk too rapidly or too loudly. Moreover, the interview should, if possible, be given a constructive turn. When the cause of the difficulty has been found, the supervisor should try to help the worker avoid future mistakes. Together, it may be possible to work out the causes and agree on methods of overcoming them. Thus, the disciplinary interview should be more than a mere bawling out but should take this positive, constructive direction. For instance, in handling a situation where an employee had a minor accident because of failure to observe some rule, and was to receive a bonus deduction as a penalty, one foreman handled it something like this, "Well, Bill, you just couldn't keep up the good work, could you? You fellows can go just so long and then you begin to feel smart and get careless. Now you'll have to start your record all over again. You will receive, of course, the usual discipline for accidents of this sort." The second foreman approached it this way, "Say, Bill, I certainly am sorry you had that accident, but I want you to know that in spite of it, I'm still confident that you're one of the safest men in the company. I've watched you work and I know how careful you are most of the time. Don't be too discouraged over this. It's hard luck to break a five-year record, but I'm sure you can start all over again now and go on for many years without another accident. You know the rules and I must apply the discipline in this case, but I know you understand the justice of that. Well, good luck and we'll start building up this fine record again." The second interview, obviously, had the constructive turn just mentioned. The situation in which the interview takes place is important. A private disciplinary situation is preferable to a public one. Moreover, the discipline should be prompt so that it will be associated with the actual offense, or else it becomes something like having a child wait until father gets home to punish him. By that time, it is a little difficult to associate the punishment with the crime. In such a situation the worker should be given a chance to present his side. There may have been extenuating circumstances. It is desirable first to call attention to the infraction, and then let the worker speak before announcing the punishment.

Individual adjustment. A supervisor will do well to make some adjustment to the individual worker in addition to observing over-all precautions for the entire group. It helps if he can learn something about the worker as an individual—his interests, his hobbies, and possibly something about his family. On occasion, it may be feasible to talk about some of these matters thus lending a personal touch. "How is your boy doing at college?" or "I hear you shot 80 out at the Municipal Links," or "Just *how* big was that fish?" Such things may seem trivial but do show the worker that the boss is sufficiently interested in him to remember some of these details. It may be feasible occasionally to talk about his progress if there is anything favorable that can be said in that connection. A friendly manner and voice help: if one is talking to an employee even about pleasant things in a harsh voice, other listeners believe that an argument is in progress, and the worker may feel that others think he is being reprimanded.

Over-all effect of good supervision. The general value of good supervision was brought out dramatically in the experience at the Hawthorne Western Electric Plant.[14] An intensive study was made of a small group of girls assembling telephone relays. The experiment originally was intended to check on such things as illumination and rest pauses. A group of girls was selected, and, after normal records of production had been obtained, was constituted as an experimental group, put in a separate room in the charge of a good supervisor, and observed meticulously by the research people. The girls went through an elaborate schedule with various arrangements of rest pauses and different degrees of illumination—several weeks under each condition. Throughout all this, production improved gradually. The surprising thing was that these objective changes produced little effect on performance in the job. If a change of illumination produced a slight improvement, reverting to the original illumination did not produce a corresponding loss. Some other variable seemed to be the causative factor. To make a long story short, the girls were under a skilled supervisor who carried out the best supervisory principles, and their morale was such that considerable variation in the surroundings could be introduced without influencing their performance unfavorably. Other factors were present, too, such as the fact that they derived a certain importance and prestige from having been constituted into an experimental group for the solution of a problem. The social factors within the group evidently played some role also, but the striking thing in the present connection was that good supervision seemed of paramount significance.

---

[14] Roethlisberger, F. J. and Dickson, W. J., *Management and the Worker.* Cambridge, Mass.: Harvard University Press, 1939.

Working Conditions

Morale is often influenced by the conditions under which a person is working. The effect of surroundings on general emotional attitude is familiar to everyone. On a dull day every thing seems to go wrong, and the attractiveness or unattractiveness of the working place operates in similar fashion. Clean windows that admit a cheerful amount of daylight, and good janitor service that minimizes the accumulation of rubbish or scrap will help. In one instance a new organization took over a plant where morale was pretty bad, and by the simple expedient of brightening it up with whitewash made an almost overnight improvement.

Comfort. An uncomfortable worker is inclined to be dissatisfied. Ventilation is an obvious factor. An earlier chapter discussed the effect of temperature and humidity on bodily comfort, and on production. In the present context the significant aspect is that, in addition to lowering production, poor ventilation has an element of unpleasantness. Moreover, the worker may not be conscious of the discomfort as such, but the unpleasant attitudes aroused by it are projected to something else. For example, a group of workers went to the tropics on a heavy construction job and almost immediately there was wage trouble. The wages were raised substantially, but very shortly there was more wage trouble. What actually was causing the difficulty was the climate, but the workers projected their unpleasantness on the most obvious thing about which they could complain, their wages. There doubtless are many instances where pronounced discomfort from the ventilation of the work place produces a far-reaching undercurrent of unrest.

The same principles apply, but to a lesser degree, with reference to illumination. Ocular fatigue may be annoying as well as conducive to inefficiency. If it is sufficiently pronounced, the annoyance may lower morale. A man who is attempting to see fine detail in his work with a distracting high-wattage lamp a foot in front of his face and with his eyes actually smarting is bound to develop an unfavorable attitude toward the work and toward the organization in general.

Noise reduces efficiency and also produces annoyance. The best kitchen crew a certain hotel ever had consisted of deaf and dumb persons. They broke a record for length of service in a department which had been noted for its high turnover. One obvious factor was their inability to hear the noise. Another was the fact that they could not yell back and forth and hurry each other at the rush hour. With their hands full of dishes or food they could not "say" very much to disturb their colleagues.

Improved attitudes are one of the favorable effects of music. There is ample indication that the workers prefer music while they work.

Miscellaneous annoyances are conducive to discomfort and poor morale, for example, a leaky room that lets the rain drip directly on the employee's bench or on the back of his neck, on top of which the foreman suggests that it will "do his neck good." The worker who has to operate in a cramped position, with resulting postural fatigue, resents the fact and perhaps blames the organization for making his discomfort necessary.

Conveniences. Another significant variable in working conditions is the provision of adequate conveniences. Sanitary facilities make quite a difference. During the war when British women were drafted from professional jobs and beauty parlors to work in war industries, the unfavorable sanitary arrangements were a shock to them and lowered their morale appreciably. The provision of lockers where the worker can keep his clothes and possessions is a help. If an employee who has to hang his coat in the hall finds that someone stole his gloves from his pocket so that he has to drive home on a winter evening bare-handed in an open car, he will naturally be angry at the firm for not providing better facilities. In very dirty kinds of work showers which enable the men to clean up more thoroughly before they go home, which makes for greater self-respect when they meet people on the way, are helpful.

Social Relationships

Social facilitation. Since we are social animals, it is natural that social factors have some bearing on employee attitudes and morale. The role of social facilitation in increasing work performance was mentioned earlier. One element in this facilitation is the fact that most people are happier when working with other people rather than in isolation. It has even been found that jokes seem funnier when they are presented to several people in a group than when they are presented to isolated individuals. Radio listeners find a program more interesting when they hear the studio audience participating. Some encouragement of the social aspect in industry, too, improves attitudes. This does not mean that the working day becomes a social occasion, but a reasonable amount of social contact, conversation, and the like contributes to morale without too great a loss in efficiency. It is even probable that the gain in the former respect offsets the loss in the latter. Management often goes further than this in encouraging outside social contacts. If workers have pleasant experiences elsewhere, which are, to some extent, identified with the organization for which they work or with the people who work there, some of that favorable attitude may spread to the organization itself. That is one justification for sponsoring employee functions such as a frolic or a jamboree, or fostering hobby clubs in which employees work together on avocational pursuits. They derive some social stimulation from this which is pleasant and may carry over to their industrial work.

Hostile groups. There are occasions when social relationships on the job have an unfavorable result unless they are properly controlled. This is the case with reference to any groups of workers between whom there is considerable hostility. Occasionally a department is found in which women of all ages are working together, and unpleasantness develops from the relations between the older and the younger. The older group is disposed to reprove the younger for presumed questionable behavior, and the younger ones, catching on to the situation, picture things as worse than reality, so that there results a lot of unpleasantness. Sometimes it is advisable to separate two such groups, so that they cannot annoy each other. The same situation may develop with reference to youthful workers of either sex, who indulge in a good deal of horseplay and annoy the older ones who take life more seriously. Sometimes an especially recalcitrant youth can be teamed up with an older, more fatherly type of person who perhaps fits into the parental role, at least enough to control the youngster and set him straight on some things. Then, of course, there are problems of racial antagonism which must be reckoned with in assignment of workers to their duties. Sometimes the nature of the work itself leads to hostility between groups as in the case of the kitchen crew *versus* the waiters in the restaurant who became very antagonistic during the rush hour.

Caste system. Cognizance must be taken of the fact that the workers themselves regard certain jobs as carrying more prestige than others. In a railroad shop a man acquired considerable social status from becoming a millwright's helper and carrying an oil can and a wrench with him. With these badges of office he was recognized by other workers who previously had looked down upon him. Even his family acquired a different status. It is unfortunate, of course, if such a person takes too much advantage of the situation and looks askance at people who previously were on his own level. From the morale standpoint, there is improvement in the case of those who get promoted to the oil can, but many others are disappointed at not reaching that level. One thing for management to do is develop other sources of prestige on the job. Special uniforms may be helpful, or titles may do the trick, as when stenographers become secretaries or retail clerks become associates.

Suggestion and Imitation

Mechanisms that deserve special mention in these social situations are imitation and suggestion. The former actually is a special case of the latter. Suggestion consists essentially of building up an idea and keeping it vividly present until it leads to action. Unfavorable employee attitudes often develop in this manner. Some little misunderstanding spreads through the whole department by the medium of rumor. A trivial point is suggested and grossly elaborated and magnified as it is transmitted. For example, the transfer of a few employees became necessary because of some reorganization. It just happened that a couple of those transferred were among the older workers and a friend commented on the transfer after twenty-five years of service. The suggestion started and, before long, the entire department had the idea that all the old-timers were going to be moved. On the other hand, suggestion may be used in a constructive way by planting favorable ideas. It is always possible to start a backfire. A casual remark made to some employee or group of employees may do the trick. Naturally it is unsound to start anything in this way that is not in accord with the facts. Sometimes, factual material which comes up through the grapevine is more effective than something that appears on a bulletin board. It is more like indirect suggestion and is more disarming and less apt to arouse opposition. Imitation is a special type of suggestion where the idea comes not from words but from observing another person doing something. The most striking instance is a panic where one person runs and the others follow. If a few workers are loyal or enthusiastic about their work, this attitude may spread through mere imitation. There are occasions where moving a few people with a favorable attitude into a group where morale is less favorable has a salutary effect in the latter group and improves conditions on the whole.

Emotional Factors

Jealousy. Emotions constitute a final aspect of employment relations involved in morale. Emotions may arise in connection with one's fellow-workers, or from more subtle causes. Jealousy is one of these emotions which relates to the fellow-workers. It may take any one of three directions—toward the worker's inferiors, his equals, or his superiors. The first of these constitutes a problem which eventually will disappear automatically. The typical case is a worker who was once a highly skilled craftsman and is now doing a routine, functionalized operation alongside another person who does not have the background but nevertheless, is just as effective in the specialized job. For instance, an old-time shoemaker who can make an entire shoe from start to finish is now cutting out soles in a factory and is not a bit superior to the youngster at the next bench, although the latter is utterly incompetent in other operations of shoe manufacture. It is natural for the old-timer to resent the fact that the youngster is receiving just as much recognition and pay and become jealous. Although this situation is unfortunate, it is a necessary result of the functionalized trend in industry. The difficulty will take care of itself eventually because few such craftsmen are now being developed and presently they will no longer exist.

Jealousy of one's equals is much more frequent and often results from misunderstanding about wages as aggravated by departmental gossip. Many a worker comes in and threatens to quit, because he has learned that he is "one of the lowest paid men in the department." The actual fact may be that he is in the upper 10 per cent, but he is completely misinformed by the grapevine. In such a case it is necessary merely to set him straight on the facts. However, it is inadvisable to give publicity to the entire payroll because workers will make numerous comparisons which would not have occurred to them otherwise, and almost everyone can find some source of dissatisfaction. It is difficult to avoid being egocentric when evaluating one's own competence. Almost any student comparing his examination paper with that of another student finds it difficult to appreciate the superior grade on the latter. About the only solution of this difficulty is to be alert for instances of ill-founded jealousy, and straighten them out in a conference when they arise. If the supervisor has already created a situation where the employees feel free to come to him with their troubles, they are more apt to consult him about difficulties of this sort.

Jealousy toward people higher up in the organization is more serious than the other two types just mentioned. It is difficult for the average worker to grasp the fact that his minor job is not as important a contribution as that of persons who carry much more responsibility. The discrepancy in the financial status of management and worker is often brought home to the latter forcibly. When he is driving home on three cylinders, the boss passes him on twelve. Furthermore, he catches glimpses of executives in white collars sitting at desks, doing nothing with their larger musculature. To him, white collar means Sunday and leisure, and the absence of overt physical activity means "soft job." Thus, he detects what he considers an unjust discrepancy between his earnings and the apparent income of others in the soft jobs. This sometimes poses a difficult morale problem. Naturally, if there are serious inequities in compensation, they should be rectified. This constitutes an economic rather than a psychological problem, but the effect of the inequities has psychological repercussions. Some further measures may be possible. If the worker feels that management's job is easy, one way to correct this misapprehension is to let him see the job from the inside. There are various arrangements whereby workers can participate to some extent in executive problems. Perhaps their representatives sit on a committee with some of the executives and deal with problems of common interest. In a system of this sort, it is desirable for the different individuals actually to come into physical proximity. A system whereby the workers get together and prepare memoranda which are transmitted up the line by mail or messenger falls short of achieving the maximum from the morale standpoint because the workers just do not ascertain what kind of people the executives really are. A system in which workers and management sit around the same table and rub elbows makes it possible for them to understand each other much better, to appreciate personalities, to realize that there is no innate hostility and that they all have a common goal. Much misunderstanding is thereby cleared up. Moreover, the workers or their representatives, if they are given some responsibilities, begin to see that managing really is work. There have been instances in which an employee who was selected by his constituents to represent them on some such committee, was accepted by management with considerable qualms because he was an aggressive individual and they expected trouble. However, when he was put to work untangling some executive problems and began to see the thing from the inside, he returned to his constituents with quite a different notion of the importance of management, and became a very constructive influence in industrial relations. No fixed pattern may be laid down for these employee representation schemes.

However, a personal meeting between different individuals and a discussion of problems of common interest is a basic consideration and should go a long way toward eliminating poor morale due to jealousy.

Fear. Another emotion which must be reckoned with in employment relations is fear, because everyone is concerned about his security. When the leaves fall in the autumn, a person begins to wonder if his job will last through the winter. Almost everyone gets sick on occasion and everyone grows old, so that the specters of unemployment, sickness, and old age stand in the offing and give an unfortunate emotional undercurrent. Management may do something to offset these. The general effort to promote security by unemployment insurance and government provisions will help. A resonable encouragement of thrift may contribute something. If the concern provides convenient facilities so that the workers can save their money and have it laid up for the rainy day, that little backlog may dull some of these feelings of insecurity. Sometimes a little economic information on business trends and inside information as to probable future developments in the particular organization may help the worker to forecast the security of his own future.

Another source of fear arises from hazards in the job itself. The worker who has to duck every time a crane swings by worries whether he will sometime fail to see it coming. The obvious solution is to eliminate the hazard. In another instance two men were operating a stamping machine in which they picked up material, placed it properly, and then either one of them threw a clutch so that the head came down and did the stamping. It was theoretically possible for one man to throw the clutch while the other's hand was still underneath the head, which worried both of them. After this was discovered, a simple mechanical device was arranged so that both had to throw their clutch before anything happened. Once this element of insecurity had been removed, their morale improved.

One type of fear centers around the possibility of mistakes in the work. There was a constant fear of errors which might necessitate doing over a lot of the work in a complicated method of bookkeeping. Some girls broke under this situation. When a new method was installed that provided frequent opportunity to check errors, the girls had more confidence, and their output improved as well as their morale.

Individual Factors—Aptitudes and Abilities

The morale factors discussed so far involve employment relations. A second set of factors deals with characteristics of the individual worker. One of these characteristics is his actual vocational adjustment. The worker who is well adjusted vocationally will undoubtedly have a more favorable attitude than one who is in the wrong job. In the latter case he is less successful in actual performance, he sees others surpassing him, and since he may not realize that it is because of his incorrect placement, he may become dissatisfied and frustrated. He may rationalize the situation: the boss has it in for him or they always give him the dull tools. If aptitude tests, interviews, or other predictors are used to get him in the right job to start with, many of these difficulties will not arise. It is of some significance to note that general satisfaction of persons in different kinds of work varies. An investigation was cited that revealed the highest incidence of satisfaction for professional workers and decreasing amounts for those in managerial, skilled, and semi-skilled work. It may be that most individuals in the professional field are well adjusted in terms of their aptitudes. There may be also more satisfactions in the work itself. The problem under discussion is more acute at the lower occupational levels, and, therefore, particular attention to improvement of morale is more significant there.

Age

Morale problems may arise in the case of particularly youthful workers. Some of them feel superior to their job at the outset. A youngster who was a big shot in high school thinks that he is going to be important likewise in his initial industrial connection. Thus, he dislikes to take orders from anybody and he knows it all. This makes it difficult for the supervisor to get him to do the right things, and if the supervisor insists, the youngster's morale is lowered in the process. Other beginners are too playful at the outset and fail to take the work seriously, to the annoyance of the older workers who lose time and earnings as a result. Another problem at this age is the undue load of outside nocturnal activities. Theoretically, it is nobody's business if the individual wishes to order his life in this way, but if it leads him to sleep on the job, management does have a concern, and if he is chronically ugly because of lack of sleep, it affects his fellow-workers. The point may be reached where the supervisor must insist that the youth get more sleep if he hopes to keep his job. For some of the other difficulties, it is possible to enlist the help of his fellow-workers in developing a proper attitude. The supervisor may call him "son" and slip into a role that will cause the youngster to listen to him more or less respectfully. The vestibule school is a good place for the youngster who is just out of school and has not been confronted with actual industrial conditions to make this initial adjustment.

At the other end of the age scale the worker is slowing down and realizes that the end of his industrial career is approaching, which is disheartening. There is no panacea for old age. But he can be commended for what he does, his load may be lightened if necessary, younger people may be encouraged to seek his advice, and a little deference now and then will help maintain his status as long as possible. If the slowing down is largely due to visual factors, a little additional illumination on the work may be sufficient to offset the ocular difficulty.

Sex

Sex differences have a possible bearing on morale. Experiments have revealed no consistent sex differences in aptitudes and abilities. Even the presumed differences in mechanical abilities did not appear when women undertook mechanical work in war industries (page 92). In the field of interests, however, there are some differences of possible significance in the present connection. Studies have been made by the simple technique of surreptitiously listening to conversations on the theory that the spontaneous topics of conversation reflect a person's interest. The investigator merely listened to conversations between men or between women and noted the general topic.[15] Some of the results appear in Table 40. The section at the left represents data from one study in which conversations were picked up in a wide variety of situations—classrooms, theater lobbies, streetcars, railroad waiting rooms, and even on the street. The section at the right involves data gathered at intermissions during musical concerts. The figures in the first, second, fourth, and fifth col-

TABLE 40

Topics of Conversation *

	Landis			*Carlton*		
Topics	*Men*	*Women*	*Critical Ratio*	*Men*	*Women*	*Critical Ratio*
Money and Business	49	12	8.2	19	2	5.5
Men				14	17	0.8
Women				12	30	4.6
People	16	37	4.5			
Sports	15	11	1.1			
Clothes				1	9	3.7

* Landis and Carlton

---

[15] Landis, M. H. and Burtt, H. E., "A Study of Conversations," *Journal of Comparative Psychology*, 1924, 4, 81–89; Carlton, J. F., *et al.*, "Sex Differences in Conversation," *Journal of Applied Psychology*, 1936, 22, 727–735.

umns are per cents of conversations between members of the sex indicated that dealt with the topic noted at the left of the row. Both studies show a distinctly higher percentage of male conversations dealing with business and financial matters, and the critical ratios are large enough to indicate that the differences are real. Conversation about people is significantly more frequent on the part of women in the first study. The other study subdivided the results according to whether the subjects were talking about men or about women. A significantly greater proportion of the women's conversations dealt with women, but the sexes differed little in the frequency with which they discussed men. The other items in the table are of less interest in the present connection. This greater interest of women in personal things is of some significance for the industrial supervisor of women. Apparently females are somewhat more responsive to the personalities of the supervisors and their fellow-workers. For example, yelling at them upsets morale more than it does in the case of men.

There are also significant differences in the emotional field. Many women workers have more things about which to worry, such as family responsibilities, and the supervisor may well attempt to discover the difficulties and, if possible, provide some remedy. The shortsighted foreman tells them to go in and "cry it out." In some instances the right sort of matron can be much more helpful than the foreman himself. No general rules can be laid down, but it is a matter of adjustment to the individual case.

Another consideration is the possibly larger amount of outside interests on the part of women, at least interests of the type which might distract them from their work because of preoccupation or worry. Women in industry with small children at home may be disturbed about their welfare to the detriment of morale. Adequate provision for child care while the parents are working tends to relieve that sort of difficulty. In emergency conditions, such as during war, some women coming from a higher economic level find it difficult to adapt themselves to the rougher conditions of factory work. This was especially true of women drafted into the British industries. The advent of women in industry in considerable numbers during the war period led some persons to worry about the moral aspect but these fears were not well-grounded. The sexes can become adapted to each other's presence in a work situation just as college students became adjusted to coeducation.

Physical and Mental Health

Physical health. Healthy people, other things being equal, have better morale. If a worker is ailing and experiences actual discomfort or is worrying about health, the emotional background leads to unfavorable attitudes toward the work. Health is not a psychological problem, but it does contribute to the mental adjustment of the workers. Medical facilities have obvious importance. Visual hygiene should be included in a health program. Sometimes a worker with a visual defect that is inadequately corrected experiences difficulty and unpleasantness in trying to see the work and becomes emotionally upset.

Symptoms of mental maladjustment. In any large sample of persons, such as a group of industrial workers, there are bound to be some members in various stages of mental maladjustment. These may range all the way from minor fears and worries to cases that are about ready for the state hospital. Some such persons merely need a little counseling or mental hygiene treatment and others should be committed to an institution before anything unfortunate happens. Any of them are liable to create morale problems either because of their own maladjustment and the tendency to project difficulties on someone else or because they may stir up other people who otherwise would maintain their equanimity. The important thing is for the supervisor to be able to recognize when the worker has some maladjustment and to get expert help on the problem. Presumably, someone is available to whom the individual can be referred for further investigation and such treatment as may be indicated. The supervisor is not in a position to do any actual diagnosis but he can be alert for common symptoms which may indicate difficulties which should be investigated (*cf.* Chapter 10). For example, there is the employee who tends to withdraw and does not respond to an ordinary greeting. If this tendency appears to be on the increase, he may be in the early stages of schizophrenia. Another type is the employee who makes very rapid motions in everything which he does. To be sure some people walk rapidly, but a normal person seldom does everything in that manner. If it seems to involve gait, motions of the arms and feet, facial expression, eye movements, it may presage the onset of a manic condition. There is the restless type who is unstable, roving around, and changing from job to job. A widely varied work history accumulated in a short period of time is suspicious from this standpoint. Other people perform aimlessly and apply themselves spasmodically by fits and starts, or an employee complains that people bother him and goes off by himself to think or even talks about quitting his job for that reason. Excessive alcoholism is a problem in itself which may or may not be pathological. It may be significant to note how the person uses his leisure time, whether he pursues interesting hobbies or whether he daydreams. Excessive crying spells may be symptomatic provided that they cannot be traced to normal causes. The supervisor may find it profitable to ask other people about the employee in question: "Do you know Bill very well?" They may mention some deviate behavior which is diagnostic. The supervisor may get significant items from the individual's own report, too. If the worker mentions something that resembles an hallucination, such as hearing people calling him names, that is serious. An employee who resents any efforts to help him and states that he will "find his own way around" may need all the more help. Some of the foregoing symptoms point toward major psychoses with unfavorable prognosis, but, more frequently, they indicate a psychoneurosis or a minor frustration that will respond to therapy. The point is, however, that the foreman cannot handle cases of this sort himself, but needs an expert to diagnose, predict, and treat the case. If the foreman merely recognizes the problem and gets this expert help, he has made his main contribution. A frequent policy, unfortunately, is to ignore the problem employee, in the hope that he will quit anyway, whereas a modicum of therapy might make him an effective and satisfied employee. It might even be argued that if nothing is done about his maladjustment and he is thrown back into the community without psychotherapeutic help, the industrial concern that failed to function at this point is culpable to some extent. It is analogous to a school which discovers something wrong with the pupil and contrives to get him to leave school rather than to correct his difficulty. After all, an industrial concern has some social responsibility.

The actual therapy for such cases lies along the lines discussed in Chapter 11. Counselors are available in some organizations who can talk to problem employees with therapy in mind. A frequently successful procedure is the nondirective type of interview. The industrial counselor in a permissive atmosphere lets the employee talk, encourages him to follow any line which he wishes to discuss, and eventually gets the main problem out in the open where the worker gains insight into his problem so that he can work out a solution with comparatively little help. The worker would not be able to do this unaided, but the counselor, with only a moderate amount of direction of the discussion, leads him to a successful solution.

Outside Factors

Home conditions. If outside situations produce unfavorable emotions, they may carry over to the inside of the plant. Among such outside factors, home conditions are obvious. If the worker is maladjusted at home, he is liable to take it out on some of his fellow workers in the plant. If he is a foreman, so much the worse, because he is in a better position to do this to his subordinates. If such maladjustments are detected, perhaps some representative of the concern can do something about them. The social worker or the nurse who have occasion to go to the homes may give some helpful advice. Care must be exercised in such situations so that efforts to help do not become paternalistic. One cannot dictate the worker's outside life—what he thinks about his wife's kindred, at what time of night he retires, what magazines he reads, or what hobbies he pursues—but sometimes a little helpful suggestion or a bit of advice may be provided without being intrusive. Family difficulties sometimes may be forestalled by interesting the family in the industrial organization and, as it were, selling them on the concern. This may help the worker's attitude likewise. If the rest of the family think he is working at a good place, even though he complains about some minor difficulty, their general attitude may be enough to break up his minor dissatisfaction. Techniques for cultivating the family in this way are common, for instance, picnics or children's parties at Christmas. There are possibilities in an open house where the families come and see just how the product is made. One of the larger electrical concerns had the plant operated by 1,700 men as skeleton crews, while 13,000 others took their families through. There was a course about a mile long with arrows and explanatory signs. The worker naturally took pleasure in showing the family the department in which he worked and the kind of thing that he was doing. If the boss could be there to greet them, so much the better.

The effect of these outside conditions on morale is indicated sometimes in studies of individual workers.[16] Take the case of a young girl in a mica-splitting operation. She was the daughter of immigrant parents, and was restricted by the extreme discipline of her parents' old-country ideas. She was unhappy about this, complained of headaches, her work was at a low output level and was quite irregular. Then for a period she received considerable sympathy from fellow-workers, and some actual companionship. During this period, her production gradually improved from 160 units up to about 200. At that time she discovered that she was financially independent and escaped from her home maladjustment by living with a girl companion. Thereafter, her production increased further to 215 or 220 units. When she had to live at home again, her production dropped to about the initial level. Obviously, the emotional carry-overs from home conditions influenced morale and effectiveness on the job.

---

[16] Mayo, E., *The Human Problems of an Industrial Civilization*, page 102. New York: Macmillan, 1933.

Recreations and hobbies may have a favorable carry-over into the worker's industrial life. Most people develop these anyway. Sometimes, however, it is possible for management to provide facilities of a recreational character, such as a playground, tennis courts, picnic grounds, or baseball diamonds. They may go so far as to sponsor teams and furnish equipment. Perhaps they may encourage the development of orchestras and provide some instruments and skilled leadership. It usually is better if projects of this sort come about apparently at the request of the employees, instead of simply being handed to them by management. In one instance a very pleasant and well-equipped area was provided for the employees and their families to use for picnic purposes. Everything was arranged and management then "gave" it to the employees. The employees did not use it very much, and it contributed nothing to morale. Another organization, which had a similar proposal in mind, began by talking to some employees about recreation. The conversation was steered around to the point where some employee suggested that it would be nice if they had some picnic grounds. Thereupon a committee of employees and executives was set up and finally evolved a proposal. However, the plan apparently was initiated by a suggestion of the employees, which made all the difference in the world.

Welfare work. Other efforts to create more favorable outside conditions take the general form of welfare work. Its underlying principles are perfectly sound. It involves gestures or gifts which are of some benefit to the individual and from which he derives pleasure. The thought is that he will be slightly grateful to the organization, and this attitude may carry over to his work. This is all right if the spirit of the thing is really sincere and is understood as such. Some employees, rightly or wrongly, think that welfare work is merely a sop which they are given in lieu of substantial financial consideration. Much depends on how well the workers understand the purpose of welfare work. Those of lower intelligence are a little more inclined to say "Put it in the pay envelope," and be unappreciative. Others, however, do find a modicum of welfare work agreeable, and their attitude may be improved as a result.

Adult education. A final factor that may make some contribution to morale lies in the field of adult education, which is receiving much attention of late years. Many middle-aged workers quit school at the earliest possible moment and now, in retrospect, actually wish that they had gone a little further before they quit. Even if they do not have this desire, they are vaguely aware that their lives are rather narrow and that they have little to interest them in their leisure time. It is possible for such persons to pursue a modest educational program in their spare time. Some of this may be directly vocational and aimed to fit the person to do the job in which he is engaged better. There is a place, however, for cultural education—subjects which have no immediate utility, such as art or literature, but which nevertheless are profitable and interesting. The pursuit of such subjects may awaken interests which a person can pursue further on his own, and occupy a good deal of his spare time. A person with these wider interests will find life more full and less monotonous, and there may be a favorable carry-over of these attitudes inside the plant to the benefit of morale.

Summary

Morale as it operates in industry is a tendency to work together enthusiastically for a common purpose. There is an increasing realization that satisfaction makes for efficient work and that difficulties which might otherwise cause industrial conflict will not do so if morale is good. Surveys indicate that a considerable proportion of workers are dissatisfied. This is especially true toward the lower end of the social scale of occupations. Workers and management do not always agree as to the most important policies and the policies that are carried out best.

If improvements in morale are to be attempted, it is necessary to have some device for measuring morale. Attitude scales are a widely used instrument for this purpose. They consist of statements which the workers check anonymously according to their agreement or disagreement with the situation. These statements deal with such things as company policy, nature of work, and various characteristics of the supervisors. Scale values for each statement are determined by securing the judgment of experts, preferably by a paired-comparison technique, and applying statistical procedures which convert the judgments into terms of a normal frequency curve.

Another source of information on morale is interviews. If rapport is good and the employees are convinced that their statements will be kept confidential, they may contribute valuable information in this way. Sometimes projective techniques wherein the employee does not actually commit himself directly but tells how the others feel about the place are helpful. Such interviews may, incidentally, have some therapeutic value. There are a few objective criteria of morale such as absenteeism, lateness, loafing, and general agitation.

The majority of the psychological factors that influence morale lie in the field of employment relations. Some of these involve direct contact between workers and management. The process of hiring creates favorable or unfavorable attitudes at the very outset. Desirable aspects include an easily located waiting room with comfortable furnishings, an interview given where the applicant is seated and talking across a desk, and a general atmosphere of friendliness. The employment interview should give information as well as secure it. If the man is hired, it is preferable to have some minor executive take him down and introduce him to the foreman who should receive him cordially and make him feel at home. A sponsor system is sometimes used to supplement this process.

The actual attitude of the first line supervisor is a very important element in morale. For one thing, he may emphasize a "we" attitude, wherein the supervisor works with the men instead of simply being over them. He should also give them as much inside information as is feasible. Individual accomplishment should be recognized wherever possible. A supervisor should be accessible and not interpose obstacles to the employee who wishes to talk to him. Many delicate situations must be handled by the supervisor and they may have unfortunate morale consequences if they are mishandled. One basic consideration is emotional control for both parties. This may be facilitated by physical relaxation. If the employee is asked to tell his story a second time, it loses some of its emotional flavor. A rational approach is preferable to an emotional one. Prompt action is necessary; otherwise the supervisor gets a reputation for stalling and encourages workers to go over his head. Disciplinary situations call for similar finesse. A breach of discipline should be considered as a symptom, and effort should be made to determine the underlying cause. Here again the supervisor must maintain his own emotional control. The reprimand should have a constructive turn, and the employee should be led to appreciate its justice. The supervisor may well make some adjustment to individual workers by familiarizing himself with their interests and hobbies. Some experiments with industrial groups have brought out strikingly the over-all effectiveness of good supervision.

Working conditions are another aspect of employment relations. General comfort of the work place from the standpoint of ventilation, illumination, or posture contributes to morale because if the place is pleasant, some of the pleasantness transfers to the job itself. Conversely, any annoyance in the work situation has a deleterious effect. Conveniences such as sanitary facilities and lockers also contribute to good morale.

Social relations often influence employees' attitudes. If their social life is congenial both inside and outside the plant, so much the better. On occasion, certain groups of employees develop hostility toward one another, for example, the older, conservative women *versus* the younger, frivolous ones. In such cases, some transfer may be desirable. Workers themselves regard some jobs as carrying more prestige. Promotion to such a job naturally helps the morale of the incumbent, but others should be given some recognition as far as is feasible. Suggestion and imitation contribute unfavorable aspects. A rumor becomes greatly magnified as it passes through the grapevine. Often it is based on complete misinformation, and the remedy is facts. Sometimes a person with a good attitude placed in with some others will improve the general level of the whole group through the medium of imitation.

A final aspect of employment relations lies in the emotional sphere. Jealousy may be directed toward one's inferiors—a craftsman who is now working in a functionalized job and earning no more than a youngster with much less craft skill. Jealousy toward one's equals is rather frequent and often aggravated by misunderstanding as to the other person's remuneration. When such cases are discovered, a factual treatment is all that is necessary. Jealousy toward persons higher up in the organization arises from the fact that the worker notes the contrast in their economic and social status, and that he perspires while they sit at desks. One of the best remedies for this difficulty is for some of the workers to participate in executive problems. Once they see the thing from the inside, they come to realize that management has a real job which does not stop even at quitting time. If a system of employee representation is used for this purpose, it is much better if it is arranged so that workers and executives sit together around the same table and become personally acquainted.

Another emotional difficulty arises through fear, much of which centers around the question of security. This fear can be offset somewhat by such things as unemployment insurance and government provisions for security and also by facilities provided by the concern to encourage thrift and savings so that the worker has a little backlog. Another source of fear lies in the actual hazards of the job. Sometimes a little engineering can eliminate the hazards and the attendant worry.

In addition to factors in employment relations, another source of morale lies in factors which characterize the individual. One of these is his aptitudes. If he is in the wrong job, it is an up-hill struggle, with attendant frustration and frequent lack of insight as to the real difficulty. Adequate placement procedures are the answer. Age sometimes poses morale problems. The youngster prominent in high school finds it difficult to engage in his first industrial job where he receives no especial recognition, or perhaps he stays out late at night with resultant inefficiency in his work. A personable supervisor who can slip into a parental role may be able to straighten him out. The vestibule school affords a good transition into the industrial atmosphere for the younger workers.

There are no essential sex differences in aptitudes and abilities, but women have more personal interests than do men and are more sensitive to personalities in the industrial situation. This requires a different attitude on the part of supervisors. Moreover, many women in industry have outside responsibilities and cares which distract them from their work or even produce untoward worry. Health is another individual factor which contributes to morale. Mental health produces an additional problem for the supervisor. There are undoubtedly many people with mental maladjustments working in industry, some of them with very minor difficulties and some practically ready for hospitalization. The supervisor cannot be a diagnostician but he should know enough about mental aberrations to recognize common symptoms which will indicate to him that expert help is needed with the case. It is a mistake to ignore such an employee in the hope that he will quit, because that merely throws the problem back on to the community. An expert to whom the employee is referred can decide just what the future holds, and, if feasible, apply appropriate therapeutic techniques.

A final source of morale lies in outside factors. If conditions at home produce emotional disturbances, they may carry over into the plant. Although management should not interfere with the outside life, a social worker or nurse may make helpful suggestions. It may be profitable to cultivate the family and interest them in the organization. Individual case studies show how production and morale correlate with favorable or unfavorable changes in outside conditions. Recreations and hobbies may be encouraged by the organization and will contribute to better outside adjustment which will carry over into the industry. If the concern is providing such facilities, it is better for the project apparently to come at the request of the employees themselves. Welfare work is all right in principle but if its aims are misunderstood, it may be rather unsuccessful. Finally, adult education has possibilities for the employee whose outside life is narrow and can profitably be broadened by something of a cultural nature. Anything that contributes to a broader and more interesting life outside may carry over into the hours the employee spends inside the plant.

22

METHODOLOGY AND SELECTING OF ADVERTISING APPEALS

THE MANUFACTURER IS confronted by the final problem of marketing his product, and this problem, too, has its psychological aspects. It is necessary to influence prospective buyers and bring the product to their attention. This is done sometimes by advertising and sometimes in a face-to-face situation by a sales person. The former aspect has been studied much more from a psychological standpoint than has the latter. Many advertising problems can be taken directly into the laboratory. Experimental work in personal selling is difficult, and, without some empirical data, the scientist is not inclined to go too far in drawing conclusions. Hence, the present discussion, like most others in the field of business psychology, will be orientated more toward advertising than toward personal selling. However, the two fields have a great deal in common, and many of the things presented in connection with advertising are applicable in the other field.

History. Advertising is not a new phenomenon; it dates back as far as 3000 B.C. In the early days few prospects could read, and messages had to be printed by hand, so that oral procedures, for instance the crier, were made use of. With the advent of printing in the seventeenth century it became possible to reproduce posters in quantity, and, moreover, many more people became literate. The early newspapers began to carry advertising. This earlier type was characterized by a complete disregard for truth. At one time coffee was advertised as a remedy for dropsy, gout, scurvy, and sore eyes. The advertising agency, which now plays a tremendous role, developed around 1850. The advertisers themselves are now keenly aware of the danger of fraudulent statements by one advertiser having an unfavorable effect on the whole profession. Hence, they make a collective effort to forestall anything that is too questionable.

To be sure, scientific facts occasionally are stretched a little farther than they ought to be, but, on the whole, there is not much downright misrepresentation.

A few introductory remarks are in order as to advertising's place in the scheme of things. Of course, its big job is to sell, and the economists testify that a vigorous selling program is basic to maintaining prosperity. Advertising has also some educational aspects. It provides information which some people would not receive otherwise. To some extent, it promotes art and music appreciation through the art work on the printed page or the musical program on the radio. With reference to speech, some radio listeners probably hear English used more effectively than they do in any other situation, although it is also possible for youngsters to pick up poor jargon from some scripts. In the field of hygiene advertising has done quite a lot to promote wholesome attitudes. It is probable that the slogan, "A clean tooth never decays," has done more to promote oral hygiene than all the individual efforts of educators. On the other hand, with so many ailments advertised nowadays there is a danger of developing a lot of hypochondriacs. Aside from marketing, advertising gets into the field of public opinion, and various agencies who wish votes, or at least the support of the public, tell their story in paid advertising. On the whole, advertising carries a heavy social responsibility, and whatever psychology does to promote advertising contributes indirectly to these larger purposes.

Laboratory Methods

Apparatus. Many advertising problems can be brought into the laboratory. Some of them employ standard laboratory devices such as a tachistoscope, in which material can be exposed for a fraction of a second to note what portion of it is observed in that single act of attention, or a chronoscope for recording length of time required to react to some particular stimulus. However, there are some techniques which have been developed specifically for advertising problems. One of these involves the investigation of eye movements while the reader is observing advertising with a view to determining what attracts the attention. The subject looks at a magazine on a rack through a piece of glass which is set at an angle. This glass has been slightly but imperceptibly silvered. Above the subject's head is a moving picture camera which photographs the magazine directly through the glass and the reflection of the subject's eyes from the glass. Each frame of the film has the eyes and the page superimposed in such a way that, with a little practice, one can locate within an inch or so exactly at what point on the page the reader was looking.[1] Another technique for recording eye movements that has been used widely in other investigations projects a beam of light on the cornea of the eye outside the pupil, and, as the eye moves back and forth when reading or observing material, the reflected image moves back and forth and can be photographed on a moving film. Much cruder techniques have the subject look at magazines or other material on a rack in front of him while the experimenter sitting across the table observes the eye movements over the top of the rack.

Dummy magazines. Many advertising problems have been studied by the general technique of having the subject look through a magazine for a given length of time or turn each page at a signal, and subsequently checking on what he can recall. Such a technique has one serious shortcoming in that it involves too many variables at any one time. If the problem is, for example, whether the subject can recall more full-page than half-page advertisements, it is possible that in the particular magazine used, most of the full-page advertisements were colored and most of the half-page advertisements black and white, so the empirical superiority of the full pages might be due to color rather than size. To circumvent such difficulties it is common practice to make a dummy magazine by cutting and pasting. It thus is possible, for instance, to include the same proportion of colored full-page advertisements and colored half-page advertisements.

Program analyzer. In the radio field a recent development called a "program analyzer" gathers data while the subjects are listening to programs either directly or by transcriptions. Each subject has two push buttons, a red and a green. When he dislikes something in the program, he holds down the red button, when he likes something he operates the green button, and when his feelings are neutral he does neither. These buttons actuate electromagnetic pens on a moving tape, and it is possible to determine at what parts of the continuity the majority of the listeners change from like to dislike.[2]

Subjective Methods

There are some advertising and selling problems which do not lend themselves to objective laboratory study so that it is necessary to rely on subjective judgments. If it is a question of which appeal would be most apt to induce persons to buy the product, the only possibility is to ask a lot of people. To be sure, some of these problems can be evaluated over a long period of time by more objective procedures, but frequently it is necessary to get subjective evaluations of this sort in the early stages. Sometimes the copy is tried on other members of the staff of the advertising agency. Some concerns employ a consumer jury, which consists of a considerable number of people who may be called upon periodically to look at proofs of forthcoming advertisements or go over recent advertisements and pass judgment. Sometimes they are paid for their services. Members of one jury received a dollar a week for listening to a certain radio program and filling out a blank about it. If a subjective method employs an adequate sample and there is considerable unanimity in certain judgments, it is possible to attach some scientific significance to the results.

---

[1] Karslake, J. P., "The Purdue Eye Camera; a Practical Apparatus for Studying the Attention Value of Advertisements," *Journal of Applied Psychology*, 1940, 24, 417–440.

[2] Hallonquist, T., "Big Annie Goes to Work," *Advertising and Selling*, August, 1945, 38, 69 ff.

Field Work

Outdoor displays. It is necessary to go out in the field to secure the data for some advertising problems. To evaluate certain aspects of outdoor advertising the subjects are loaded into an automobile and driven by some poster boards, usually without warning. After they get around a corner, the car is stopped, and they are given pads and requested to write down the names of the products they recall having seen advertised on the board or else to use a checklist and recognize such products from a larger number. This technique makes it possible to check on such factors as the location of the poster boards or the content of the advertising.

Indoor displays. Another type of field study involves watching people in some situation where posters or other advertising materials are on display, and tabulating certain types of behavior. If a bank is interested in the attention value of posters displayed in the lobby, a certain poster is placed on the rack and somebody unobtrusively counts all the people who enter the bank and those who stop and read the poster. Presently another poster is substituted and the percentage who stop to read that one is determined. Similar procedure may be used in connection with window displays. It is possible to note how many pedestrians pass the store and what proportion come up to observe the window display. This procedure was extended in one instance to use the pedestrians in a more systematic manner. A booth was built in the window with some attention devices like large question marks on the flanks. In the front of it was a rack on which advertising materials could be displayed and changed from inside the booth. An observer in the booth could watch the people outside the window through a one-way screen.

Whenever a pedestrian approached the window, the experimenter inside the booth threw a lever which presented two advertisements on the rack in front. The subject looked at these two advertisements and if one of them appealed to him more than the other or attracted his attention to a greater extent, he naturally spent more time observing it. Meanwhile, the experimenter inside watched the eye movements, pressing one key when the subject looked at the left advertisement and another key when he looked at the right advertisement. These keys recorded electromagnetically on a moving tape so it was possible subsequently to determine what proportion of the time the subject spent looking at each advertisement. After a thirty-second period, these two advertisements were removed and two others substituted, and the same procedure repeated. Data were gathered in this manner as long as the subject remained at the window. The interesting feature was that he was entirely naïve and revealed by his behavior which items were most effective in controlling his attention.

Magazine habits. Another field method involves observing persons reading magazines or other media. If the problem is, for example, whether they spend more time looking at the right or the left page in a magazine, it is possible to sample readers at random, and, at the moment of observation, note whether they are looking at the right or the left page. In one such study the experimenter went through the waiting rooms in a medical office building, pretending that he was a patient in a hurry and stopping just long enough to observe each person before going to the next office. Occasionally, a waiting room has been equipped with a one-way screen so that someone could observe the readers in detail without being seen himself.

Audimeter. One field method has been developed specifically to determine the extent to which people listen to particular radio programs. With the owner's permission, a small device is installed inside the radio receiver which records on a moving tape for a period of perhaps a week just when the set is turned on or off and the actual frequency to which it is tuned. The tape is then removed and analyzed with reference to program popularity. Unfortunately, this does not tell the whole story. The set may be in operation while the "listeners" are playing bridge and paying no attention to the program. Or perhaps someone turns down the volume while answering the telephone and forgets about it, but the record shows that WLW was tuned in for twenty-four hours. Such errors, however, tend to average out in a large sample of data.[3]

---

[3] Nielsen, A. C., "Trends Towards Mechanization of Radio Advertising," *Journal of Marketing,* 1942, 6, 217–228; also, Nielsen, A. C., "Two Years of Commercial Operation of the Audimeter and the Nielsen Radio Index," *Journal of Marketing,* 1945, 9, 239–255.

Interviews

Gallup type. Many marketing problems may be approached by interviewing users of the product or prospects in some standard fashion. One such technique was originated by Gallup and is often identified by his name. It involves going through a magazine or newspaper with a person and having him indicate which advertisements he remembers having seen. This reflects, to some extent, the attention value of the advertisement or, as the commercial companies call it, the "stopping power." The interviewer goes to the door with copies of several recent magazines. He inquires if the family takes any of these magazines and if so, he asks further whether they have read this particular issue. If the answers are, "No," he thanks them and proceeds to the next house. If, however, he finds some magazine which the person interviewed admits having read, then he suggests, "Would you glance through it and point out to me those pages which you definitely remember?" Thereupon he thumbs through the magazine quickly and the subject says, "Yes" or "No" for each page, while the interviewer makes appropriate check marks in the margin.

One source of error in this technique is false recognition. The subject may "recognize" an advertisement he never saw in that magazine. This may be demonstrated by presenting advertisements from current magazines together with some forthcoming advertisements which have never appeared anywhere. In some instances as many as 50 per cent of the latter were incorrectly recognized. It is possible to work out a correction factor by finding about what per cent of forthcoming advertisements are incorrectly recognized and deducting that amount from the proportion allegedly recognized in the interview. Another difficulty is that if one advertisement is found to be superior, it is impossible to tell which variable caused that superiority.

Interviews regarding brand preferences. A different type of interview asks the subject about the brand he uses, or why he uses it, or what he likes about the product. The objective is to determine how to provide products that the consumers will like and will purchase. The interviewer is provided with a standard schedule of questions.

Sources of error in interviews. In this connection it is necessary to avoid ambiguities and to phrase the questions so as to get the desired information. For example, if the question is, "Why did you buy this brand?" some might construe it correctly to mean what aspects of the product influenced the purchase, whereas others might cast about for some advertisement which was influential, or for some friend's statement. If information is wanted as to the actual features of the product which appeal to the user, it is well to ask for it specifically. It may even be desirable to use a checklist including such items as flavor or ease of preparation. Another possible source of error is bias on the part of the interviewer himself. He may be well intentioned, but his own biases may enter into the results. This came out for example, in some studies in the field of public opinion where persons were being interviewed about certain labor problems. When people in the laboring class were interviewed by white collar interviewers, the results were appreciably different from those obtained when the interviewers were from an apparently lower economic level. It is probable that the interviewers had their own opinions which were reflected somewhat through the medium of suggestion. Another source of bias may be the interviewer's general effort to be helpful. If he knows that he is working for the manufacturer of a particular brand of soap, and is asking people about their soap preferences, he is liable unintentionally to lean a little in the direction of the soap made by his employer. To offset this tendency, many interview projects are so arranged that the interviewer is blind as to the sponsor—does not know which company is seeking this information.

Suggestion in the wording of the question or the general manner of the interviewer may introduce an unwanted variable. A well-trained interviewer would not use leading questions, but there are more subtle considerations within the range where he would think that he was not exercising any suggestion. It even makes some difference whether the question is phrased in a positive or negative form. This point was mentioned in connection with legal testimony (page 310). When persons were asked if they thought advertising was less truthful than a year or two ago, 56 per cent said "No," whereas when they were asked whether they thought it was more truthful, 47 per cent said, "Yes." Theoretically, these percentages should have been identical.

Sometimes the interviewee may not give an adequate answer because it would be embarrassing to him. When persons were asked directly which metropolitan paper they read, many mentioned the *New York Times,* although they did not actually read it, because they felt it was to their advantage to appear to be the type of person who read the *Times.* To get at the real facts the interviewers asked about favorite comic strips or favorite columnists and thus identified the paper read. Another way to embarrass the interviewee and spoil rapport is to ask too many questions to which he must reply, "I don't know."

Sampling problems. A good feature of interviewing techniques as contrasted with questionnaires is that it is possible to control sampling. It is a basic principle that the sample investigated should be typical of the entire group about whom the information is desired. If it is a question of the brand preferences of a million users of the product, the sample drawn should be typical in the sense that brand *A* would be mentioned by the same proportion as would be the case with the entire million. It is common practice to ascertain the proportion of the potential purchasers who are male and female, old and young, from various income groups, and the like, and then select a sample to interview that embodies those same proportions. Then there is always the question of the size of the sample. A frequent practice is to conduct a certain number of interviews, figure the percentages under consideration, then conduct say a hundred more interviews, and compute the percentages again. If there is a considerable change in the crucial percentage, the sample is not large enough. The sample may be increased a hundred at a time until several successive additions produce no essential difference in the results.

Telephone interviews. It is possible to obtain some kinds of interview data over the telephone. This is done quite extensively in evaluating radio programs. A large number of telephone calls is made nightly by certain agencies, asking the respondent if the radio is tuned in, and if so to what program he is listening. It is thus possible to find what proportion of the sample at 7:00 P.M. is listening to a designated program. The results are complicated by the fact that many people are not at home, and it takes a relatively large number of interviews to get an adequate breakdown on given programs. Sometimes a thousand telephone calls are necessary to get twenty-five mentions of a particular program or station.

Reliability and validity. Two studies deserve special mention inasmuch as they made an effort to determine statistically the reliability and validity of commercial interviews.[4] The interview dealt with the brand of a given product which had been purchased most recently. Forty-eight hours later the interviewer returned to the same individuals, stated that he had lost the original sheet and was naturally embarrassed and would they help him out by answering the questions a second time. It was thus possible to determine the per cent who named the same brand on the second interview as on the first. The percentages varied from 85 for tires to 97 for beer, and averaged about 90, which indicated a fair degree of reliability. In order to check on validity, that is, the extent to which the interviews predicted actual use, data were secured from retail stores which had customers who bought most of their food supplies at those stores. From a considerable number of accounts in each store, it was possible to select respondents who had purchased recently the articles under investigation. These persons were then interviewed, and the agreement noted between the brand they named as the last one purchased and what was revealed by the actual sales slips at the store. The agreement ranged from 100 per cent for bread down to 62 for flour, with an average of about 78. These results indicate a fair validity for this type of technique.

---

[4] Jenkins, J. G., "Dependability of Psychological Brand Barometers," *Journal of Applied Psychology,* 1938, 22, 1–7; 252–260.

Inventories

A procedure which is sometimes incorporated in the interview is to make an actual inventory of products in the home. If the problem deals with soap preferences, the interviewer contrives to get into the kitchen or bathroom and count the cakes which are stored there. In another instance housewives were induced to keep all their empty packages, which the interviewer collected periodically. A similar device was to offer to buy back all the old magazines for a modest consideration. If the housewife went to the basement and dug out a lot of old copies, the interviewer had tangible evidence that those particular magazines had been in the home.

Questionnaires

Type of questions. Interviews are costly, so many commercial investigations resort to less expensive questionnaires. Once the questionnaire has been worked out carefully the only remaining expense is for postage and analysis of the results. The questions must be formulated once and for all because the questionnaire does not have the flexibility of an interviewer who can adapt himself to whatever happens. Categorical questions may be asked requiring a yes or no answer, but in such cases there is always a danger that if the respondents had no opinion at all, half of them would express a certain preference by sheer accident. Many questionnaires use a multiple-choice form in order to minimize accidental responses or require arrangement of the alternatives in order of merit. A free expression is sometimes used, but this may scare off some of the respondents if it looks a bit difficult. It is likewise advisable to avoid suggestion in the questionnaire just as in the interview.

Sampling error. The problem of sampling is still more critical in questionnaires because only a small proportion is returned, and there may have been some selective factor which determined who did reply. For instance, a questionnaire dealt with newspaper-reading habits, and the first round indicated that 65 per cent read the *Gazette*. Strenuous efforts were made to increase the sample by writing urgent letters to some of the unresponsive group, pointing out that this was an experiment and if they had never answered a questionnaire before, would they please do just this one. Quite a large additional number finally came through, but in this group 75 per cent read the *Gazette*. Obviously the responsive group was not typical of the entire population. This result could not have been foreseen but it was an obvious source of error. Generally speaking those who are interested in a product or a proposal have a greater tendency to reply to a questionnaire. Here, again, it is desirable to avoid things that might be embarrassing. For example, a lot of respondents hesitated to admit that they did not have a radio although this was actually the case. Efforts are made frequently to increase the number of returns. The questionnaire is livened up by thumbnail sketches in the margin, or a covering letter tells what it is all about and enlists cooperation. In a few instances respondents are paid for their efforts. Most advertisers hesitate to do this for fear of developing the tendency for no one to answer a questionnaire without remuneration. In one instance persons were asked to listen to a number of radio programs and answer some specific questions, and a dollar bill was enclosed. Many of them actually returned the dollar and said they enjoyed the experience and did not feel they should be paid for it. A few instances have been reported in which a modest payment for the questionnaire did increase returns very appreciably. Such increase is desirable because, as the sample becomes larger, it becomes more typical. If the sampling error is not too great, the questionnaire is an expeditious and inexpensive method of obtaining the results.

Coupon Returns

General methods. A procedure that has possibilities for checking on various features of advertising is to secure returns from actual advertisements. The standard practice is to include a coupon in the advertisement and note how many of them are sent back. Then some aspect of the advertisement may be changed and coupon returns noted again. A widely used index is the cost per inquiry. If the advertisement costs a thousand dollars and five hundred replies are received, the cost of each inquiry is two dollars. It is advisable to put a key such as a different street number or a different desk in the various coupons to tell from which advertisement a given coupon was clipped. This method is widely used in test campaigns. If a manufacturer is going to advertise on a national scale, he prepares several pieces of copy and tries them out on a smaller scale to see which pulls the best.

Control of variables. The procedure just mentioned may secure the answer which the advertiser wants—which copy to use—but it does not contribute much to solving psychological problems. The difficulty is that the advertisements in the test campaign usually differ in several variables rather than in just one. Perhaps one advertisement has a picture, whereas the other does not; they have different headlines, and one employs much more white space than the other. If one pulls more than the other, it is impossible to tell whether the result was due to the picture, the headline, or the white space. It would be entirely possible to have the two advertisements identical except for one variable, say a picture, so that any difference in returns could be attributed to that variable. But it just is not done in this way. Another variable which must be controlled, if possible, is the actual groups to whom the two advertisements are presented. If the ads are run in two different magazines, the clientele may be quite different, and the results not comparable, or if they are run in successive issues of the same magazine, there may be changes in interests and needs in the meantime. A method which circumvents these difficulties is the split-run technique. A given number of a magazine is printed in two editions which are identical except that on page 48 of one edition is one advertisement and on page 48 of the other edition is a different advertisement for the same product. Copies of the two editions alternate in coming off the press so that even in a small shipment going to a certain town, half of them will contain advertisement *A* and half of them advertisement *B*. Thus, the clientele will be practically identical as to geographical location, income group, interest, and every conceivable variable. This constancy was checked in one instance by using the split-run technique with identical advertisements and the two editions differing only in the key in the coupon. The numbers returned from each edition of the coupon differed by less than two per cent, which indicated that the two samples obtained in this way were practically identical. This procedure has a good deal to commend it.

The inducement. A variable is introduced into this situation by the inducement offered in the coupon. Sometimes the coupon itself is designed to catch attention, perhaps with a big colored spot on it or a heavy arrow pointing to it. The reader might be caught by the coupon rather than by the advertisement itself so that receiving a large number of coupons would tell the researchers nothing about the effectiveness of the advertising copy. To be sure, there are occasions where coupons are employed merely to make up a list of prospects, but if the objective is to check on the actual quality of the advertising itself, coupons should not be particularly conspicuous. Sometimes instead of a coupon a hidden offer is used—a statement in the text that if the reader will send a postcard he will receive something. An occasional difficulty with the coupon itself is inadequate space for the signature. When measurements were made of signatures written in normal fashion and of space on coupons, it developed that almost none of the spaces for half-page advertisements were as large as the average signature length, and in standard size magazines only 20 per cent of the spaces were as long as the average signature.[5] Another problem is whether to make a free offer or charge for the sample or other inducement. In some investigations it was found that there were 56 per cent as many returns with the charge as with a free offer. Moreover, the results depend somewhat on the nature of the inducement. An offer of a free booklet brought 560 inquiries, whereas in an identical advertisement an offer of a free sample of soap and ointment brought 5,000 replies. Obviously there is no categorical answer as to the advisability of charging for the coupon. However, prospects who actually pay for the coupon are more liable to be real prospects in the sense that they may be sold. Certainly the charge will eliminate children who play store and housewives who believe that postage is less expensive than the actual purchase of breakfast cereal. In some instances it may be well to try it both ways and see what happens.

Historical Method

One other method is occasionally used to obtain information about psychological advertising problems. This consists essentially of taking back numbers of a magazine and counting the frequency with which some particular device or principle is involved. For example, the per cent of the full-page advertisements which were colored might be determined for the January, 1900 issue of Harpers, for the January, 1905 issue, January, 1910, and so on. If an increasing proportion of the advertisements are colored, it suggests that color was effective, and if the proportion decreases it suggests that color had not been very successful, and the advertisers had tried something else or had been forced out of business. It is a matter of survival of the fittest with reference to some particular device or principle. This method sometimes is a useful supplement to some of the others discussed above.

Consumer Analysis

Another introductory point should be mentioned before launching into the consideration of selling appeals—a shift in emphasis in modern selling. In the old days a company decided what it would like to manufacture and then secured someone to unload this product by sheer force of personality and the sundry devices of salesmanship. Now the emphasis is more on a preliminary consideration of what the prospect wants and what one might hope to sell him without too much resistance. Instead of battering down sales resistance, the idea is to detour around it. If it is ascertained that most prospects want cars with four doors, a certain kind of windshield, and a shield-shaped radiator, the company that makes that kind of a car is more apt to sell it. A manufacturer of a breakfast cereal spent $40,000 in a vain attempt to sell his product in France. A preliminary survey would have revealed that Frenchmen did not eat cereal for breakfast. This type of analysis also leads to less returned goods because people under sales pressure are induced at times to buy something which they really do not want and when they have time to think it over, they regret their action and bring the item back.

---

[5] Poffenberger, A. T., "The Return Coupon as a Measure of Advertising Efficiency," *Journal of Applied Psychology,* 1923, 7, 202–208.

Matters investigated. One field frequently investigated in this consumer analysis is the brand preferences mentioned earlier. If most purchasers of soup seem to be using a particular brand, the manufacturer of another brand may look for some shortcomings in his product or procedure. Another problem is the qualitative differences in the product, for example, different shades in hosiery or other clothing. With reference to gum flavors, unexpected regional differences were found with the East liking mint, the Middle West, fruity, and the West, cinnamon flavors. This procedure may be extended to packaging. If a manufacturer wishes to develop a new package, he interviews people on what shape and appearance they prefer. It is also possible to discover reasons for preferences—for example, to interview owners of a gas furnace as to why they like it. These selling points can then be used on new prospects. Kleenex was originally designed to remove cold cream, but in the course of some investigations, it developed that there was much greater interest in its use as a substitute for handkerchiefs, and henceforth that aspect was stressed in the advertising. A manufacturer of a cooking fat interviewed users of a competing product and discovered things which they disliked about it, such as its getting rancid or getting too stiff when kept in the refrigerator. Thereupon, he set about to devise a product without these faults and was quite successful.

The method. The methods involved in consumer analysis are usually questionnaires or interviews. One supplementary aspect is sometimes involved, which consists of observing behavior of the user objectively. Samples of a product differing in certain respects are made available for distribution in a situation where any prospect picks out the one he wants and takes it with him. It is simple to note, for example, which shade is selected most frequently. It may be possible to get prospects to try two or three brands and report upon them. Sometimes a demonstrator in a store corrals people who pass and gives them two or three types of cheese on a cracker to get an expression of their preference. A toothpaste manufacturer had interviewers inquire what brand was used and then left with the prospect a sample of that brand and a sample of a new brand, both labeled in code, with a request that he use both samples and compare their merits. The interviewer checked with him a couple of weeks later as to his preference and reasons.

Direct and Indirect Suggestion

Nature. A major consideration in advertising psychology is the appeal which is to be used in inducing the prospect to make a purchase. It is convenient to think of appeals as falling in two large categories which someone has designated as "short-circuit" and "long-circuit." The former, as the name implies, goes directly at the prospect and by means of suggestion gives him the idea of purchasing or else touches off some basic instinctive tendency. The latter reasons the matter out with him or gives him information about the product.

Objections to direct suggestion. The most obvious way to plant an idea of doing something is to tell a person to do it. This procedure is followed in some advertising and selling: the prospect is told to stop and buy this particular product. However, for most persons this direct procedure is none too desirable. They resent the blunt command to do something. It is much better to use finesse. Most of us like to feel that we are making our own decisions and that we are captains of our souls. Hence, direct suggestion is apt to arouse opposition. To be sure, there are some people who just can't seem to decide. The retail sales person is familiar with them—the customer who would spend half a day buying a necktie unless the clerk made the decision for him. But most persons resent the blunt directive and it is better to approach the situation indirectly.

Association. One way of achieving suggestion indirectly is to set up an association between the product and some person who may have profited by its use. If a cosmetic is named after some well-known person who is beautiful then the reader of the label gets the idea of using that preparation to promote her own pulchritude. Mere display of the name itself carries a good deal of suggestion. The radio program, for example, gets the name of the brand into the name of the program itself—"Camel Caravan." The radio also introduces indirect suggestion by facetiously inserting remarks about the product as part of the continuity. This often is more disarming than a direct sales plug at the end. The memory for the name of the product may be almost below the threshold and still be effective.

Display. There are possibilities of indirect suggestion in display. If a pile of cans in a retail store is perfectly regular, customers hesitate to break its symmetry. If, however, a few have been taken out, the customer suspects that somebody else took a couple of cans, which gives him the idea of taking a couple himself. Along similar lines are display racks in which paint brushes are arranged so that the handle is sticking out directly toward the customer, or pens or pencils so placed that if one just extends his hand naturally, the pen will be in exact writing position.

Atmosphere. A subtle aspect of indirect suggestion involves the atmosphere in which the product is presented. A merchant who sold fancy silk and parchment lamp shades found that it promoted sales in his large display room to have a victrola behind the palms in the corner playing chamber music. The subdued, plaintive atmosphere seemed to get the customers in a receptive attitude. Another store had a girl dressed in oriental costume flitting around among the lamps and lending an exotic atmosphere to the display. Along the same line is the candy box with a ribbon around it, which adds nothing to the flavor but nevertheless suggests that it is a better grade product. The dragonfly on the bottle of perfume does not affect the odor but does create atmosphere.

Product in favorable setting. Sometimes it helps merely to show the product in use in a pleasant setting: a picture of two people in evening clothes on a roof garden and "Fatimas, nothing else will do." The reader would like to be there himself but perhaps he lacks a tuxedo and might not be admitted to the place anyway. Nevertheless, he can get Fatimas and, to that extent, he has a vicarious fulfillment of his desires. A concern was promoting a face powder with a very ordinary name by means of a radio program called "Evening in Paris" which featured catchy music and tried to create the atmosphere of the sidewalk cafés. People began to come into the drug stores and ask for "Evening in Paris" face powder, rather than its more prosaic name. Someone caught the point, the concern printed new labels, and the Evening in Paris brand outsold all others for some time. It capitalized on this vicarious desire for Bohemian life which was promoted by the name.

Another device for lending atmosphere centers around personnel. A retail store with a uniformed doorman derives a little prestige. The doorman may occasionally help somebody open the door, but his main function is to create atmosphere by his ornate and dignified presence, even though he may be feeble-minded. Uniforms on waiters and waitresses create an atmosphere for a restaurant or hotel. It is well, however, to consider the clientele which one is trying to reach. A small town restaurant was attempting to catch the tourist trade and found that waiters in tuxedos scared them away. When they employed waitresses in less formidable uniforms, business picked up considerably.

Aroma. A subtle type of atmosphere in selling involves actual odors. These may influence preferences more than would be suspected. This was demonstrated interestingly in a study of preferences for women's hosiery. Interviewers went from house to house with four samples of identical hosiery three of which had on the inside a bit of perfumer's blotting paper with a drop of perfume on it. The effect of the odor was practically below the threshold as shown by the fact that only 2 or 3 per cent of the subjects commented on any scent at all. The interviewer explained that he was interested in getting opinions on the quality of the hosiery and he spread his four samples around the room so that the odors would operate separately if at all. The women examined these samples and ranked them in order as to quality. When the data were complete, it was found that the sample with a narcissus odor had been selected as best quality 50 per cent of the time, whereas by chance it should have been selected only 25 per cent. In other words, the odor which was almost unnoticed did have its effect on judgments of quality.[6]

In some instances odors have been used in promoting sales. A druggist sprayed perfume in the telephone booth and persons noticing it inquired about the brand and bought some. In the old days the barkeep tossed a few quarts of beer on the sidewalk in front of the place so that on a hot summer day the advertisement was quite obvious. Restaurants have been known to arrange their blower system so that some of the food odors went outside to the street. In printed advertising it is possible to use a perfumed oil in the ink. A newspaper ran a display for a florist with some pictures of flowers and the ink itself was given an odor something like roses. A fire insurance company put out a booklet which was scented to resemble burned and moist wood. A Chamber of Commerce in the Northwest sent out promotional material with a piney odor.

Radio atmosphere. Similar efforts are made to create atmosphere on the radio by providing a program which is especially appropriate to the product. Barn dances sponsored by chewing tobacco are a case in point. Manufacturers of home remedies such as vaseline have found it profitable to employ a homey, folksy type of radio program. Another aspect is that such programs may attract the kind of listeners who are the best prospects.

---

[6] Laird, D. A., "How the Consumer Estimates Quality by Subconscious Sensory Impression," *Journal of Applied Psychology,* 1932, 16, 241–246.

Talking ostensibly to a different prospect. A further type of indirect suggestion is to aim the advertisement ostensibly at one group of prospects and let the others overhear, as it were. A manufacturer of watches advertises to railroad men and actually addresses them to the effect that if they want to get their trains off on time, this watch will enable them to do so. The general reader, however, gets the disarming suggestion of an accurate watch. Another instance is the radio announcer who tells the children how this breakfast food will make them husky, All-American boys. He talks directly to the youngsters, but mother may be listening and gets the suggestion of the desirability of making her offspring husky.

Testimonials. One more type of indirect suggestion is the testimonial. This is an extension of the everyday practice of getting the judgment of friends about some product which one thinks of purchasing. At the outset, some people were favorably impressed by a product which they had purchased and actually wrote the manufacturer a note of appreciation. Presently someone got the idea that it might be well to let other folks know how these particular individuals appreciated the product, and some of the letters were published. However, the matter soon got out of hand because when the testimonials revealed their effectiveness, the next step was to go out and secure them deliberately rather than wait for spontaneous expressions of approval. The most expeditious way to secure them was to buy them. Finally Famous Names, Inc. induced a lot of well-known people to sign a blanket contract that, for a certain consideration, they would endorse any product specified by the corporation. Thereupon, they offered to secure for a manufacturer an endorsement of his product by almost any famous person he could name. Eventually the public caught on to the fact that persons with no qualifications whatever for evaluating a product were endorsing it. For instance, there was the half-back who stood near the bottom of his class at a military academy whose typewriter was "the greatest aid I ever knew in keeping up my grades"; or the operatic contralto who endorsed a brand of cigarettes although she did not smoke; and the noted tennis player who used one brand of cigarettes for his nerves and a little later, when he became an actor, smoked a different brand which was kind to his throat. As the public lost confidence in the genuineness of the testimonials, their effectiveness declined. However, it was such a good device at the outset that the advertisers have been loath to give up the idea entirely. Now they present pictures of persons who look as though they knew what they were talking about although they are not mentioned by name, and these persons in the advertisement say something favorable about the product. A beverage manufacturer ran a series of distinguished looking men grasping a tall glass without actually quoting them. Such practice does give a certain type of endorsement but does not have the opprobrium of the paid testimonial. Or again the bellboys at a swanky hotel talk together about the types of clothes that they usually carry out to be pressed, indicating that people who frequent this resort wear a certain brand of clothes. Still further removed from stigma is the picture of a calf with the heading, "I drink Alderney milk myself." Thus, it still is possible to secure some of the value inherent in the testimonial principle while avoiding the taint of the paid testimonial.

Positive *versus* Negative Suggestion

Danger of dissociation. It is possible to tell a person directly to buy some item, or to tell him not to do something, expecting him to do the opposite—"Don't Say Ice Cream, Say Telling's," or the railroad advertisement during the war, "Don't Travel this Christmas." There is a danger with this negative type of suggestion that the negative portion may not remain as an integral part of the suggestion. Telling people not to travel at Christmas might give them the idea of taking a holiday which otherwise they would not have considered. Asking them not to say ice cream might, nevertheless, give them the idea. It is a good deal like a door marked, "Don't Enter," which makes one anxious to do so, whereas otherwise it would never have occurred to him. A "wet paint" sign is irresistible to many people. It is the same problem of negative suggestion noted earlier in connection with moving pictures or plays which are supposed to teach that crime does not pay, but actually make crime appear interesting. This dissociation was brought out quite clearly in connection with the advertisement that featured "pink tooth brush." Actually, the pinkness was supposed to be a symptom of something wrong with oral hygiene which could be remedied by a particular toothpaste. However, many people asked the clerk for a pink tooth brush. The idea of pink tooth brush had become completely dissociated from the rest of the context and misfired as far as the advertiser was concerned. Hence, negative suggestion is of dubious value because of the danger of dissociation and actually planting the wrong suggestion. Some of the railroads, during the war, instead of using the negative "Don't travel" mentioned above, suggested rather, "You Can Get a Furlough Next Week and He Can't." There has been a pronounced decrease in the use of negative suggestion in advertising. In 1900 in a typical sample of advertisments, 18 per cent embodied what was essentially negative suggestion, but 30 years later the figure was down to 2 per cent, presumably indicating the ineffectiveness of this approach.

Negative appeal. A distinction should be made between negative suggestion and negative appeal. The former involves actual use of the word "No." Negative appeal, on the other hand, merely presents some situation which a person would be inclined to avoid. It might be a picture of a person with a toothache which could have been avoided by the use of a specified dentifrice. Or there is the copy about the chap who used a match in lieu of a flashlight to examine the gasoline tank. The reader may be disposed to provide himself with a flashlight in order to avoid similar embarrassment. There are situations in which the negative appeal is entirely satisfactory. Apparently, it depends on the product and on the way the copy is handled. One study was made by taking pairs of advertisements for such things as toothpaste, drinks, breakfast food, sanitary articles, and educational courses, each member of a pair dealing with the same product and quite similar in other respects, except that one had a negative appeal and the other a positive. Their comparative effectiveness was ascertained in terms of coupon returns. In almost half the cases the positive appeal was superior, and in half, the negative appeal.[7] Certainly there is no basis for generalizing that negative appeals are universally ineffective. There is a possibility that with some such appeals, if the copy is made extremely unpleasant, the reader will turn the page quickly to get rid of the unpleasantness before he really catches the point. Such cases, however, are not frequent. In general, then, negative suggestion is questionable although negative appeal may be satisfactory depending largely on the product and the way the copy is handled.

Product in Use

A type of suggestion which sometimes is effective is to show a picture of someone using the product. An open package gives a greater suggestion of using the contents than does a sealed package. A picture of someone running a vacuum cleaner or pushing on an accelerator inclines the reader to do likewise. Imitation is actually a special case of suggestion. It should be emphasized, however, that the person who is to be imitated should be an individual whom the prospect would be inclined to imitate anyway. A prospect in the upper economic brackets would not be favorably impressed by a picture of a laborer using some product to make his hair stay smooth. It is better to show somebody of the prospect's own social level or above it.

---

[7] Lucas, D. B. and Benson, C. E., "The Relative Power of Positive and Negative Advertising Appeal as Measured by Coupons Attached," *Journal of Applied Psychology,* 1929, 13, 274–300.

Carrying Out the Suggestion

Coupons. A final consideration is that the advertisement should be arranged so that the suggestion can easily lead to action. If there is any opposition to speak of, the suggestion may not be effective. The personal salesman has the advantage here that when the prospect is under the influence of a suggestion, the order blank can be provided immediately. The nearest thing to this in advertising is the coupon. It affords a means by which a prospect can do something about it when he has succumbed to the suggestion. A card which he can mail is still more effective, because it requires less effort than tearing out a coupon and hunting up his own envelope. The coupon should be designed with a view to its convenience, otherwise the slight difficulty may be enough to break up the suggestion.

Miscellaneous. It may be feasible to urge the prospect to use the telephone, particularly if the organization has a branch in the local community. Sometimes it is tried both ways—urging readers to send in the coupon or telephone MAIN 5000. If a proportionately larger number of telephone calls is received, it may be profitable to concentrate on that method thereafter. It sometimes is found also that the telephone prospects are "hot," that is, can be developed into actual sales more quickly. A device for facilitating the suggestion, if the suggestion involves going to some particular place, is to provide a map or diagram. Incidentally, it is well to avoid having the suggestion itself too complicated. A company which sold fish by mail suggested the following schedule: "Send me all charges prepaid east of Kansas, one case, six packages of your fresh packed lobster, each package enough for two or three persons and a free can of lobster sandwich filling. I will try one package and if not pleased I will return the rest to you and pay you nothing. Otherwise I will send you three dollars and ninety-five cents within ten days." Most readers would hesitate to let themselves in for such a complicated sequence of contingencies.

Characteristics of Instinct

The other type of short-circuit appeal is frequently termed instinct. Instead of merely suggesting to the prospect that he use the product, the advertiser frightens him into buying tire chains, sells him a car that is bigger than his neighbor's, makes him crave the taste of the beverage, or arouses the hope that the cosmetics or the perfume will result in fewer lonely evenings. There is some controversy as to the nature and extent of these fundamental tendencies. It is generally conceded that there are some innate drives such as food, sex, and fear which are adaptive from a biological standpoint in that they facilitate the organism's survival without the individual himself being aware of these biological ends. There is disagreement as to the number of these and the extent to which they are innate or partly based on learning. The tendency to seek food is obviously more basic than the desire to be collegiate. It is not necessary for the advertising psychologist to go too far into this controversy. Suffice is that these basic tendencies exist. As far as the advertiser is concerned there are three characteristics of so-called instincts which play into his hands. In the first place, these responses are quick. If a person gets angry and does anything at all, he reacts right away. Moreover, these tendencies are vigorous. In an emergency of any sort it is obvious that the individual reacts in vigorous fashion. In the third place, these tendencies are universal. Almost anyone can be frightened or interested in food under the proper circumstances. Thus, it is quite in point for the advertiser to make some use of these tendencies in selecting appeals with which he hopes to induce persons to buy something. Some of these instincts will now be mentioned with indications of how they are used in advertising.

Food

The appeal to the food instinct is obviously appropriate in selling food products. The advertisement may emphasize the smoothness of the ice cream, the "tang of green hickory" in the cured ham, or may show pictures of delicately colored beverages or a food product being served at a well-appointed table to nice people. The transparent container is sometimes useful in store display to show how the product actually looks and it may constitute a selling appeal.

One word of caution is in order: the danger of showing the product in a setting which will arouse unpleasant associations. The advertisement should be considered from the standpoint of what else it may suggest through a normal process of association. This is especially pertinent with reference to food advertising which touches people so intimately. A packing house wished to emphasize the cleanliness observed in the preparation of the product and ran pictures of a slaughter house with the workers in white coats and everything quite sanitary. Unfortunately, this reminded the readers that they were carnivorous and touched off an unpleasant train of associations. After all, one does not like to realize that he is eating a piece of a cow but prefers to consider it as beef steak.

A picture of a cute child messily eating the product is another instance of unfortunate association which reminds the prospect of uncleanliness instead of making him desire the product.

Sex

The sex instinct probably is used more widely than any other in advertising copy. This may reflect, to some extent, the overwhelming role which this motive plays in everyday life. The usual advertisement implies that by using the product in question one will be more attractive to the opposite sex. It is scarcely necessary to give examples because of their ubiquity. This type of copy is especially adaptable to beauty preparations and clothing.

The effectiveness of this motive in actual selling is indicated in the following instance. It is the custom of certain publishers of cheap novels to market them under one title and if they do not sell readily, to change the title with what little reprinting is necessary. For instance, "Fleece of Gold" sold 6,000 copies. When it was reprinted under the title, "Quest for a Blonde Mistress," the sale was 50,000. "Casanova and His Loves" sold 8,000, whereas the same work entitled, "Casanova—History's Greatest Lover" sold 22,000.[8]

Parental

Many readers are responsive to appeals dealing with the welfare of children. Cameras are sold so parents can photograph the youngsters—"That was the summer when Betty was three." Automatic sprinklers for public buildings feature the school house fire. Various articles of safety such as fences to keep the dogs out of the yard or electric heaters to keep the youngsters warm while dressing touch off this same type of appeal. Quite apart from selling products of interest to parents, there are many instances in which an attractive, interesting picture of a youngster has good attention value quite apart from the product itself. In this connection, however, if the picture is irrelevant the reader may spend his time looking at the picture and not get the sales message.

Fear

There are occasions when it is desirable to frighten a prospect into buying something. "Scare copy" is especially appropriate for safety devices, products which are conducive to health, and, sometimes, for insurance. The unfortunate consequences of not having tire chains is an old stand-by. Fear is an instance of negative appeal. Much of its effectiveness depends on how pertinent the danger actually is. A remote possibility like being struck by a meterorite would not arouse many persons, but if the local newspapers have just featured an airplane which crashed into a house, it is possible to scare many owners into taking out the appropriate insurance. Some question may be raised as to the desirability of using this motive as extensively as is done with reference to physical ailments. A recent count discovered something like eighty diseases mentioned in advertisements. This conceivably might create a lot of hypochondriacs. There is the further ethical question of how far one should go in advertising that may lead the individual to diagnose his own ailments when he really needs expert medical treatment.

---

[8] Hepner, H. W., *Psychology Applied to Problems of Business,* page 540. New York: Prentice-Hall, 1931.

Self-Assertion

Self-assertion, that is, preserving one's own life by fighting off the opposition, is often appealed to in advertising. The veneer of civilization is rather thin, and if someone crowds ahead of a man in line at the ticket window or gets into a parking space which he was just preparing to enter, the troglodyte breaks through. Even some people of high intelligence become perturbed in an argument. This tendency is capitalized on in advertising by appealing to the desire for success, or independence, or surpassing other people in some way. A correspondence course urges one to lead the procession rather than follow it, by virtue of having taken this course. Prospects are urged to get the best type of product or the latest edition in order to be superior to their friends. Vanity is another manifestation of this tendency. If a person is admired, he is to that extent superior. An automobile show room provides a mirror so the prospective purchaser can sit at the wheel and see how she will look to her friends. The user of a certain product should "expect to be stared at."

Fashion. An extension of this self-assertion tendency that deserves special mention is fashion. This appears to be a combination of the desire to be superior to other people by being different and the tendency to imitate a leader. Whether it is on Fifth Avenue or in Fiji, one lady secures, for example, some green beads and temporarily is out ahead of the rest and derives some satisfaction from asserting herself in this way. When the others begin to imitate the leader and wear green beads, she must put buckles on her shoes or change her coiffure in order to achieve superiority, and so it goes. Merchants are aware of this tendency and feature the latest models and styles and sometimes stress the fact that there are no duplicates in a particular sale. The compelling character of this motive is brought out dramatically in some instances. In a coal mining region one winter, there was a bad situation due to unemployment. The families were destitute and, among other things, lacked shoes. Some philanthropist sent them a consignment of shoes which were seconds but serviceable. However, it happened that these were high shoes when the fashion was low shoes, and the women refused to accept them. They preferred to struggle along with newspaper in their worn-out low shoes rather than wear a good pair of high shoes. This fashion motive, however, is quite unstable, and some unexpected factor may upset it overnight to the detriment of the manufacturer who has stocked up. A light visor with straps over the head was widely adopted for sports wear until truckdrivers started wearing them which ended the fashion as far as the upper-crust was concerned. On the other hand if some prominent person adopts a certain item of clothing or a certain color, it may start quite a vogue. Manufacturers sometimes are interested in changing fashions, but it is difficult to do this expeditiously on a large scale. When they wished to lengthen women's skirts, presumably so as to sell more goods, they did it in about three stages, first, a fish tail in the back, then dropping them at the sides, and finally getting them down all around. It may be possible to make drastic changes in a small community by getting a few of the leading people to adopt a particular fashion. On a college campus, for example, if a few of the prominent members of the student body are induced to wear some exotically colored trousers or sweaters, the whole campus may follow suit. One should be cognizant of the danger in misrepresenting that some item is the fashion. A small town merchant, for example, falsely advertises that some product which he stocks is the style in the big city. He sells a lot of them, but then some member of the community goes to the city and discovers the real facts, and the misrepresentation boomerangs.

Play

Play is practically universal and has some possibilities for the advertiser. Vacation resorts, steamships, and railroads feature golf, or horseback riding, or canoeing at some resort. Along similar lines are the advertisements for sporting equipment which appeal to the interest in fishing and hunting. A picture of a group cooking around a campfire, or someone calling a moose, or playing a fish makes a strong appeal to those who have played in the wild country.

Curiosity

It is very easy to arouse curiosity. The old stand-by is stopping on a street corner and looking upward until a crowd gathers. In a football stadium thousands of people rise to their feet and strain to see a distant spectator attempting to carry too many hot dogs. At one of the World's Fairs a company gave away a small souvenir savings bank and a long line of people were filing up to the booth. Interviewers went along the line, asking people what was going on, and it developed that about 30 per cent of them did not know what was at the end of the queue, but had lined up out of curiosity.

Teaser copy. The outstanding example of curiosity as an advertising motive is the so-called "teaser copy." This involves something like "Watch this space," or a large question mark, or "Butternut is coming," or something which causes the reader to wonder just what is in store. The curiosity is an attention device rather than an actual inducement to buy. Some concerns that first used it were very successful. Persons talked about the new name and speculated as to what it was so that when the dénouement finally arrived, they were receptive. This device has been used so frequently that many people have developed an immunity to it. Moreover, it is unfortunate if curiosity is aroused to a high degree and then there is a distinct letdown. If a person expects something big and it turns out to be trivial, he will be disgruntled at the agency that deceived him in this way. This difficulty may be forestalled by having the teaser campaign give some hint as to the general nature of the product without revealing everything. In one such campaign for a new automobile it was merely featured that "Terraplane is coming," but thumbnail sketches in the margin of the advertisement indicated that it was something in the automotive field. Thus, the final revelation was not a complete shock. Another campaign built up to the opening of a new store on a certain street corner. The teaser copy featured "Something's hatching," with a picture of a signpost at the corner of the street with the street names on it, and a bird's nest on top of the sign. This tended to locate the forthcoming item and tied in well enough with subsequent advertisements about the actual store.

Other uses of curiosity. Almost any novel device may be conducive to curiosity: a store window was covered with opaque material except for a small hole, and passers-by lined up to peek. Crowds will gather and speculate about some device in a store window such as a clock which goes with no apparent mechanism or a faucet with the water flowing up rather than down. The text of the advertisement may be put in a balloon coming out of a keyhole which suggests that the reader is snooping. In the continuity strips in the paper or in the serials on the radio the curiosity motive leads many persons to read the strip the next day or listen for the next program.

Other Motives

Constructing. Some people derive pleasure from putting things together. Through this motive it may be possible to sell them yarn to make a sweater by featuring the satisfaction of doing it, or sell them a kit with which to make some contrivance such as a radio receiver, and induce them to do it largely because of the pleasure derived from constructing the thing themselves.

Bargains. Many people are susceptible to the bargain appeal, which is difficult to locate in psychological categories. It has been suggested that, to some extent, it may reflect the collecting instinct or getting something for nothing, but probably involves more than this. At any rate, this appeal is widespread as can be demonstrated any Monday morning after bargains are advertised in the Sunday paper. The following instance is illuminating. A mail order concern was preparing to send out a large number of circulars which had previously been tested. The article was priced at $2.68, but in setting up the final copy, the printer made a mistake and put it $3.95. It was too late to reprint so the company, with a good deal of misgiving, provided some clerks with red ink and had them cross out the $3.95 and write in $2.68. Contrary to all expectation, the actual returns in proportion to the number sent out were over twice as great as had been the case in the test campaign. Evidently, many of the recipients thought the red ink meant bargain and reacted accordingly. Bargains have a strong advertising value.

Bargains, however, should not be confused with cheapness. One may like an item at a low price but not want something cheap and of poor quality. In fact, much interest sometimes is shown in expensive articles. The first moving picture that was advertised as costing a million dollars had a tremendous impact. One spring a New York store advertised a thousand-dollar Easter hat, and police reserves had to be called out to handle the crowd, although nobody actually bought the hat. In an Art Gallery there is a picture which, according to the catalogue, is worth $750,000. Most visitors pass right by it on the first round, but when they sit down to rest and read the catalogue, they notice this value and come trooping back for a look. There are also other appeals which may be classed as short-circuit, although they do not touch such a fundamental instinctive basis as the foregoing. They include such things as neat, patriotic, modern, popular, clean, collegiate, beautiful, conducive to hospitality. These values have been built up by experience, but they are quite general and have somewhat the force of the more innate characteristics.

Long-Circuit Appeal

It is impossible to sell everything by means of the short-circuit appeal. A frequent form that the long-circuit appeal takes is providing information about the product. This may involve showing how it can be used or presenting the process of manufacture. Sometimes it may even stress the personnel of the firm. This last is especially pertinent in financial advertising where the integrity of the personnel may be an important consideration. In some cases it is effective to give information about the raw materials. A window display which shows all the parts constituting a telephone and indicates the source of the materials from which each part is made gives the impression that somebody has gone to a lot of trouble to provide this device for the convenience of subscribers.

If the advertiser is furnishing information, he should make it specific rather than present glittering generalities. Instead of indicating that prices have been "slashed," it is well to indicate how much. If the advertisement reports the results of some kind of a study or survey, it is well to indicate just how many people were involved. A kitchen cabinet, for example, was "designed by 369 women." Evidently, this many women had contributed opinions on various aspects of the product. Such figures, however, may become dull and uninteresting, in which case it is advisable to attempt to dramatize the statistics. A pencil manufacturer had the pencil write on a moving strip of paper, measured the total length of the line before the lead was all gone, and then headlined, "Thirty-Five Miles for a Nickel." A tube of shaving cream "contains 350 shaves." It was also estimated that, "There are enough men wearing Paris garters to elect the next President." There are also the various advertisements about somebody buying a particular brand of tire every so many seconds. It is even legitimate, sometimes, to put things "end to end," and determine how many would be required to reach the moon.

In addition to providing information, it may be desirable in some cases actually to go through a process of reasoning. The advertisement locates the difficulty in the short life of automobile tires, and then shows just how the difficulty may be remedied by using a particular brand. Vitamin products are sold by telling about experiments on white rats.

The relation between belief and desire. It would seem offhand that beliefs are based on reasoning processes but this is not universally so. People sometimes believe a thing largely because they want to believe it rather than because they are convinced by the evidence. A noted scientist who should have known better went in for spiritualism because a near relative had died and he was very anxious to communicate with the departed. He actually threw his science out of the window under the compelling force of desire. An interesting experiment was made as a check upon this particular point.[9] Various propositions in the fields of religion, ethics, politics, and science were submitted to a considerable number of people—propositions such as "Is democracy the best form of government?" "Does a black cat crossing one's path give bad luck?" "Does death end personal existence?" These propositions were rated on a scale from 1 to 10 to indicate the extent to which the subjects believed the statement. On another occasion the same subjects rated these same propositions on a similar scale as to their desirability. In a final series they made a judgment as to the extent to which the statement was a matter of opinion or was based on evidence. When the data were complete, the three variables of belief, desire, and evidence were correlated with each other. The average correlation between belief and desire was .81, whereas that between belief and evidence was only .42. These results bear out the point that belief is not always produced by a reasoning process, and it may be possible to convince a person of something quite apart from the logic of the situation. Sometimes a statement about an advertised product involving big words which the prospect does not understand will do the trick. A safety razor was advertised as having "a fulcrum shoulder and a channeled guard so that the blade has a major and minor flexure and can be adjusted to a thousandth of an inch." Persons shown the advertisement agreed that is was a better razor. However, when they were questioned in detail as to their understanding of the description, they had no idea what was meant by a fulcrum shoulder or a channeled guard. The big words to them merely meant better razor. On the other hand, it may be possible to overdo this technical discussion and frighten them away. There is also a limit to credulity in the case of extreme statements about the product. If it is claimed, for example, that the fountain pen was intact after being run over by a road roller, the average reader may become skeptical. Anyway pens so seldom get in the pathway of road rollers that it is scarcely necessary to make pens which will take that much punishment. If the reader's credulity is taxed too much, whether or not the statements are true, he may resort to logic again and feel that the advertisement is fraudulent. Studies have brought out the fact that many current claims in advertising which involve some kind of heroic test are regarded with skepticism by a fair proportion of readers.

Order of presentation. A problem arises in connection with long-circuit copy as to the order of presentation of the items. The advertisement may present the need or the want and then follow with the solution which can be implemented by means of the product. On the other hand, the copy may start out with some characteristics of the product and then show how it meets the prospect's needs. For example, for a throat antiseptic, the headline is "The party she missed" because of a sore throat, followed by discussion of the therapeutic properties of the product; or it could be, "A safe antiseptic" and then an indication of how it might facilitate attendance at social functions. The question arises as to whether one order is preferable to the other. A fairly extensive experiment dealt with this particular point.[10] Forty advertisements were used, half of them with the want preceding the solution and half *vice versa.* They were presented in a dummy booklet, with recall and recognition techniques. The average recall score for advertisements beginning with the want was about 26 per cent superior to that for the advertisements beginning with the solution. With aided recall, that is, where the name of the product was presented and the subject required to give the brand, the superiority of the want procedure was 13 per cent. In recognition it was only 8 per cent. The trend, thus, is consistently in favor of presenting the want prior to the solution. This seems logical because this is the order in which the user's thinking actually operates. He generally has a difficulty or needs something and then casts about for a remedy. He seldom thinks of a commercial product and then tries to find some way to use it.

---

[9] Lund, F. H., "The Psychology of Belief: a Study of its Emotional and Volitional Determinants," *Journal of Abnormal Psychology,* 1925, 20, 63–81.

Rationalization

One other type of appeal should be mentioned, namely, a combination of the long- and the short-circuit. Rationalization is a common tendency in everyday life and was discussed earlier in connection with clinical psychology. A student goes to the movies when he should stay home and study, and convinces himself that he will be more effective in studying if he has a little relaxation first. In advertising and selling it is possible to induce persons to buy automobiles out of jealousy of their neighbors and then talk to them about mileage. Clothing is frequently sold because of its smartness, but the sale is supplemented with additional considerations of durability. The electric refrigerator is marketed originally because of the delicious frozen desserts, but this point is supplemented by after-thoughts of economy. One value of this rationalization approach in marketing is that if a person is sold only on a short-circuit appeal, he may think it over later and regret his action, or perhaps some other member of the family will regret it for him. If, in the course of the sale, he has also been given some logical reasons for making the purchase, he can use those to justify his action to himself or even to the other folks. Embodying some rationalization in the advertising may forestall this subsequent dissatisfaction.

---

[10] Strong, E. K., Jr. and Loveless, J. E., "Want and Solution Advertisements," *Journal of Applied Psychology,* 1926, 10, 346–366; also 1927, 11, 8–24.

Selecting the Appeal for the Product

Motives in general. Having noted some of the different possibilities in the way of advertising appeals, the next question is which one to use in a specific case. The problem involves two broad considerations: adjusting the appeal to the product and to the prospect.

It might appear logical offhand to study the comparative strength of motives in general in everyday life, on the assumption that these relationships would pertain to advertising. If interest in the family is a dominant motive day in and day out, it ought to be a good way to induce people to buy something. In this type of problem, unfortunately, it is necessary to resort to subjective methods and ask people why they do certain things. For example, a considerable number of subjects were presented with a list of forty-odd motives to action and asked to indicate for each one how important it is "in determining your own actions from day to day." They rated these motives on a scale from 1 to 10, and a hierarchy of motives was obtained in this way. The next step was to obtain a similar hierarchy for these same motives as applied to advertising. This was done by formulating the appeals quite in the abstract, for example: "1W5 Durability. Combine Utility with Durability by using 1W5. It lasts one third longer than the ordinary article." Subjects rated appeals of this sort in general without reference to a specific product. The crucial question, then, was the agreement between the order of the motives in the two lists. They did agree in such things as family affection and appetite, but there were glaring discrepancies. Health was at the top of the list in everyday life but dropped to about the middle of the list with reference to advertising. Ambition showed similar discrepancies. There is not sufficient agreement between the order of effectiveness of motives in everyday life and in advertising to warrant using the former as a basis for selecting appeals. Further investigation should be limited specifically to advertising.[11]

The next question is whether there are any appeals which are universally effective in advertising. The answer necessitates comparing the aforementioned hierarchy of abstract appeals with studies of those same appeals in relation to specific commodities. Here again, a considerable discrepancy is found. Family appeal, for example, ranks high in the abstract, but low for breakfast food. Economy is about average in the abstract but further down with reference to clothes or shoes, and higher with reference to pianos. Recommendations have a high rank for food but are low in the abstract. Apparently there are no universally good appeals, and the advertiser must study his particular product and what specific appeals will be effective for it. Determining the best appeals for a product may utilize some of the methods discussed earlier—such as the returns in a test campaign, or a consumer jury, or interviewing persons on why they bought the product and what features appealed to them.

---

[11] See Burtt, H. E., *Psychology of Advertising*, pages 111 ff. Boston: Houghton Mifflin, 1938.

There are occasions where several appeals are selected systematically and then combined in the same advertisement. In such an instance it is well to watch for incompatibility among the appeals themselves. If the advertisement features the flavor of the toothpaste along with considerations about the bacteria and decay in the oral cavity, the latter certainly will detract from the effectiveness of the taste appeal. It is better not to try to mix appeals as incompatible as these two.

One general principle for the selection of appeals appears to have some factual basis. Short-circuit appeals are better for personal articles like toilet goods, stationery, luxury goods, display and adornment such as jewelry, flowers, and dresses, articles enjoyed for their own sake like drinks and musical instruments, and things conducive to bodily safety such as antiseptics, or insurance, and food products. On the other hand, the long-circuit appeal is necessary for items that involve an extensive financial outlay. It would be difficult to sell a man a restaurant by appealing to the food instinct. It would be necessary to talk about investment. Aside from this generalization, there is little that it is safe to suggest to the advertiser interested in selecting an appeal for his product. It is necessary to make a specific study of his problem.

Adjusting to the Prospect's Intelligence

The other consideration in the selection of advertising appeals deals with the prospect as contrasted with the product. Two characteristics of prospects are important in this connection—intelligence and interests. Earlier chapters considered the general nature of intelligence, how people differ in it, and how it may be measured by standardized tests. The advertiser may have to adjust himself to a wide range of intelligence. Morons and geniuses both eat breakfast food, but some differentiation of advertising copy is necessary in order to influence both of them. One obvious aspect of the problem is the vocabulary used in the advertisement. It may be recalled that vocabulary is one of the items included in some intelligence tests, so if the prospects are known to be of higher intelligence, the advertiser can talk a different language. This makes possible a greater flexibility in copy, so that it is more compelling or picturesque. Describing a cooked ham as "a gem of succulent tenderness and running juices blanketed in a golden brown crust of crackling goodness," to the reader of fair intelligence calls up pleasant associations. But it goes over the head of a person lower in the scale and perhaps annoys him to boot. If it is possible to segregate the prospects according to their degree of intelligence, well and good. If, however, there is no certainty as to the intellectual level of the readers of a particular advertisement, the only recourse is to step the vocabulary down to the approximate level of the lowest individuals. As a matter of fact, the average adult has a vocabulary of around 9,000 words which he can understand. The number which he actually uses is much smaller than this. The discrepancy between the language employed by advertisers and by the users of the product was brought out in one study.[12] Fifty users of toothpaste, shaving cream, and automobiles described their favorite brand, then fifty advertisements for those same products were analyzed. The customers used about twelve and a half words per sentence, whereas the advertisements used twenty and a half. Furthermore, the consumers used about four sentences in their descriptions and the advertisers about eleven. Along this same line it has been found empirically that many people misunderstand words which are commonly used in advertising. A recent survey discovered that three fourths of the people in the South Atlantic States thought that "obese" meant stupid, two thirds of those in the Middle West felt that "sonorous" meant sleep producing, and four fifths of those in the South considered "voluptuous" to mean large or bulky.[13]

Concepts and reasoning. In addition to vocabulary, the advertiser may well watch his use of concepts or general ideas as related to the intelligence of the prospect. People lower in the scale simply cannot grasp complicated notions as readily. Calories and vitamins are not as meaningful to them as to persons higher in the scale. There also are differences in ability to go through a process of reasoning. Sometimes the advertisement gets complicated in this respect. For example, it shows how the arch is the vulnerable part of the foot and how important it is to have the weight evenly distributed over that region by a certain kind of shoe. Some prospects follow this logic, whereas others do not.

---

[12] Hepner, H. W., *Psychology Applied to Problems of Business*, page 539. New York: Prentice-Hall, 1931.

[13] Anonymous, *Printer's Ink*, April 5, 1940, page 93.

Determining the prospect's intelligence. It is obviously desirable to have some method for evaluating the intelligence of the readers of a particular advertising medium. Although some cases are obvious—the *Atlantic* vs. the *Police Gazette*—it is better to approach the problem objectively. It is possible to get some notion of the intelligence of the readers of a magazine or newspaper by analyzing its editorial material with reference to vocabulary and sentence structure. For example, in one metropolitan newspaper 13 per cent of the words were over two syllables in length, whereas in another the figure was only 8 per cent. The first had 17 per cent of the sentences ten words or less, whereas the second had 23 per cent of that length. Somewhat similar results were found with two magazines.[14] It is a reasonable assumption that if the magazine or newspaper itself has an extensive vocabulary and sentence structure in its editorial material, it is being read by persons who are in the upper portion of the intellectual scale. Whether the magazine set its own level and thus attracted readers at a certain intelligence level or whether it gradually adjusted itself to its clientele cannot be determined. The fact remains that its readers are at a certain point in the scale, and the advertiser can govern himself accordingly.

Indirect indicators. Some indirect notion of intelligence may be obtained from information about the subscribers to a magazine, if it is available. It is well established (page 196) that professional people average the highest in intelligence, followed by business and clerical workers, then by skilled workers, and finally unskilled laborers. Thus, if most of the subscribers to a certain magazine are in the professional class, that immediately tells something about their intellectual level. In one large city it was found that the business people read the morning paper and the working people the evening paper. The advertising implications of such a finding are obvious.

Adjustment to Permanent Interests

Adjusting the advertisement and the appeal to the interests of the prospect is important because of the relation between interest and attention. Almost everyone is inclined to pay attention to things which interest him, and interest, as it were, sets the stage for the advertising appeal. Prospects differ greatly in their interests, both permanent and transitory. With reference to the former, one of the most obvious aspects is the individual's vocation. A machinist is likely to be interested in things mechanical and would notice the grinding of gears in a passing car.

---

[14] Kitson, H. D., *The Mind of the Buyer*, pages 60 ff. New York: Macmillan, 1921.

Another type of permanent interest is avocational. Anyone who goes in for fishing or golf can be aroused easily by conversation about those topics.

Locating prospects of given interests. If it is desired to utilize these permanent interests, the first problem is to locate the prospects accordingly. In some cases it is simple to find a medium which is read primarily by persons in a particular group. The trade or professional journal is a case in point and is read primarily by persons with a known interest pattern. Similarly for avocational interests such as hunting and fishing, some of the outdoor magazines segregate the prospects. There are even media which reach the neurotic fringe with a profound interest in health, happiness, and prosperity—the so-called inspirational magazines. There is often some differentiation of interest within the pages of a single issue. Some readers spend all their time on the sporting pages, whereas others stick to the real estate section. The advertisement in these sections can thus count on a certain interest on the part of the reader.

Terminology. Once the individuals with a given interest are located, one obvious procedure is to sell them products appealing directly to that interest. Radio receivers may well be advertised on the pages adjacent to the radio program and fishing equipment may be featured profitably in *Field and Stream.* More subtle is the use of terminology appropriate to the interests of the reader when selling something of more general nature. When the manufacturer is advertising cigarettes, for example, in different trade journals, it may be profitable to talk their language. In a financial magazine a cigarette advertisement presented such things as "an *issue* for smokers," "*par* excellence," "*100 per cent* satisfaction," and thus utilized the business terminology with which the readers were familiar. Advertising in college papers often essays the college lingo. It is desirable to adjust the content of the appeal aside from the terminology to the interests of the reader. An advertisement for a throat antiseptic featured a picture of a subway crowd and the contagious nature of colds and sore throats. This copy had gone through a test campaign in a metropolitan center and appeared quite successful. When it was presented on a national basis and printed in a rural magazine, it missed the point entirely because the readers there had never been in a subway and were not concerned about bacteria in crowds.

Transitory Interests

There is also a possibility of adjusting the appeal to the temporary interests of the prospect. The audience at a concert is, for the moment at least, interested in music, therefore, advertising on the program dealing with musical instruments—"Piano by Steinway"—fits right in with their momentary interest pattern. Similarly, a theater program is an opportune medium for advertising restaurants, night clubs, and places to go after the show. The readers of the program are pleasure bent at the time. A sticker which says, "Rubbers" is more effective when seen through a rain-swept window than it is in bright sunlight. An organization that promoted apartments in downtown Manhattan had a very timely illuminated display at the West End of one of the ferries across the Hudson to the effect that "If you lived at London Turrets you would be home now." Commuters going across the ferry with perhaps an hour on the train ahead of them would be quite impressed by such copy. Another common instance is the appeal to the Thanksgiving or Christmas motive shortly before those holidays. The effectiveness of this appeal suffers somewhat because of the fact that so many other advertisers are doing likewise. Even radio advertising can make some adjustment to temporary interests. On Sunday, for example, the audience is more relaxed and set for better kinds of music and even for serious talks. In the early morning there is a market for programs to cheer people up and start them off on the day.

Adjustment to different ages. There are occasions in which the advertiser makes a definite effort to reach prospects of a certain age, either through some magazine which goes to a particular age group or through mailing lists. There are some minor adjustments which might be made in the appeals and the copy as related to age. For example, adolescents show a tendency to react a little more readily to emotional stimuli. This period is often characterized by hero worship, daydreams, religious experiences, and general excitability. Perhaps this tendency has been overemphasized to some extent, but it probably is sufficient to be of interest to the advertiser. This means that he may utilize to a greater extent the short-circuit type of appeal and that an emotional approach will probably be successful. Moreover, there have been some indications of change in interests with age.[15] These were explored with the interest inventory discussed earlier (page 93), and the results were analyzed with reference to items on which different ages made different choices. Items involving skill and daring showed marked decreases in frequency of mention with advancing age. There was a clear tendency for oldsters to dislike interference with established habits and customs. This is the well-known conservatism of middle age. Thus, the advertiser would be less successful in promoting new gadgets when approaching the older type of prospect. In an automobile, for example, the older group would not be as interested in the new type of gear shift, nor would they react favorably to the thrill of driving a fast car. There also may be age differences in sensory preferences. There have been indications of such with reference to perfume or the tartness of pineapple juice. At the other age extreme, there may be possibilities in actual adjustment of terminology to the prospect. In boys' magazines, for example, it may be well to use the somewhat rough and ready expressions to which the youngsters are accustomed. It is the same point mentioned earlier of talking the prospect's own language.

---

[15] Strong, E. K., *Change of Interest with Age.* Stanford: Stanford University Press, 1931.

Sex differences. To some extent the appeal may be geared to the sex of the prospect. There are empirically no clear sex differences in aptitudes and general abilities, but indications are that women have more interest in people as contrasted with the more abstract and business interests of men. This has a possible bearing on advertising which is directed to women and the desirability of more of the personal type of appeal. It should not be assumed, however, that just because a product is purchased primarily by women, the advertiser should stick exclusively to a feminine appeal. Many such purchases are scrutinized by men, both before and after, and frequently both parties need to be influenced by the advertising.

Geographical differences. Some mention should be made of a variable that sometimes has a bearing on advertising copy. In different parts of the country different names are used for the same product. For example, the words hydrant, tap, and faucet are applied to the same kitchen facility in different regions. If the copy is being written in local media this can be handled satisfactorily, but in a national campaign the result sometimes is unfortunate. In a certain region, for example, a plumbing concern might be talking about hydrants with complete understanding, whereas that same advertisement in another region would suggest the fire department and miss the point entirely. Colloquialisms should be used with considerable caution.

Summary

Many problems of advertising psychology can be taken into the laboratory and studied with appropriate apparatus, for example, photographing eye movements of a person observing advertising material. The widely used technique of having subjects look through magazines followed by recall and recognition tests may be improved by making up dummy magazines in which the extraneous variables can be controlled.

In the radio field the program analyzer has listeners push buttons according to whether they like or dislike parts of a program. Sometimes it is necessary to use subjective methods such as the consumer jury. Some problems must be handled in the field. Subjects can be taken past outdoor displays and then checked for recall or recognition. Observers of posters in a lobby or pedestrians who stop at a window display may be counted. Readers of magazines under everyday conditions may be observed with reference to habits of manipulating the magazine. A device may be installed in a radio receiver to record actual use of the receiver over a considerable period.

Another methodological approach utilizes interviews. Some take the form of thumbing through a magazine with interviewees and noting what items they remember having seen. Others deal with preferences for particular brands. The interviewer must be on his guard against various sources of error such as ambiguities in the questions, undue suggestion if he knows what manufacturer is seeking the information about preferences, and possible embarrassment of the interviewee. The sample interviewed must be selected so as to be typical of the entire clientele. It has been possible to check the reliability of interviews by calling on the same clients twice, and to check validity by comparing expressed preferences with sales records in local stores. A supplementary procedure is taking an actual inventory of different brands in the home. Questionnaires are more expeditious than interviews, but many questionnaires are not returned which aggravates the sampling error.

Another method utilizes coupon returns. As ordinarily handled in a test campaign, this does not solve psychological problems because the advertisements under investigation in the campaign usually differ in several variables. It is also important in such cases to control the sampling of persons reached by the different advertisements. The split-run technique greatly simplifies this problem. Other variables are the inducement offered in the coupon and the extent to which the coupon is designed to attract attention to itself. The historical method occasionally is useful. This involves tabulating the frequency of use of an advertising principle over a considerable period of years. If it has been used throughout or even to an increasing degree, this tends to indicate that it has been successful.

Consumer analysis is a useful means of forestalling a lot of wasted effort in trying to sell people something they do not want anyway. It is possible to determine what characteristics of the product are preferred and then govern oneself accordingly in manufacture. The factors which affected some users favorably may be discovered and employed in selling other persons.

A major consideration in advertising psychology is the appeal used to induce the prospect to make his purchase. One phase of the so-called short-circuit appeal is the use of suggestion, that is, presenting vividly the idea of purchasing the product. Direct suggestion usually is inferior to indirect because it tends to arouse opposition. The indirect type may be achieved by setting up an association between the product and some well-known person who may have profited by its use. A subtle aspect is the atmosphere or background against which the product is displayed. This may involve merely an attractive package or it may involve showing nice people using the product in an attractive setting. Even the doorman who operates in front of a building lends some atmosphere to the establishment. Odors have possibilities of lending atmosphere too.

Another type of indirect suggestion is to address one prospect but let others listen in, such as the radio announcer talking to the children about breakfast food. Testimonials embody indirect suggestion but they have come into considerable disrepute because of the paid testimonial. The motive is still used in presenting pictures of unnamed people who look as though they knew something about the product and endorse it.

Positive suggestion generally is preferable to negative. In the latter case there is a danger of dissociation whereby the negative does not remain as a part of the total suggestion and the prospect gets the idea of doing the wrong thing. Negative appeal as distinguished from negative suggestion merely presents an undesirable situation which the prospect may avoid by using the product. Negative appeal may be effective on occasion.

A successful type of suggestion is to show the product in use, which leads the reader to imitate. It is a good idea, however, for the model to be one whom the prospect would be inclined to imitate anyway. It is also advisable to make it possible for the suggestion to be carried out readily. Any slight obstacle such as inadequate space for a signature on a coupon may break up the suggestion.

The other type of short-circuit appeal involves the so-called instincts. From the advertiser's standpoint these are universal, quick, and vigorous types of response. Appealing to the food instinct is a very natural way to sell food products, but it is necessary to be on guard against setting up unfavorable associations in this sphere. Sex probably is more widely used than any other instinct in advertising copy and is particularly appropriate in promoting items which will make the user attractive to the opposite sex. Parental interest is effective in selling things that will be conducive to the welfare of youngsters. Fear is a frequent motive particularly in scare copy where the unfortunate consequences of not using the product may be stressed. Self-assertion can be utilized by showing how the product will put the user ahead of other people. Vanity is one manifestation of this tendency. Another is fashion, in which a person derives superiority by being different. Fashion is a powerful motive and also is quite unstable. Play has some possibilities for the advertiser of recreational facilities or equipment. Curiosity often is used in the form of a teaser campaign which hints at something forthcoming. It is well to avoid too severe a letdown at the end of the campaign.

Sometimes a long-circuit appeal is indicated. It may involve information about how the product is made, or how it may be used, or the raw materials, or even the personnel of the firm. It is well to be specific in providing information, and dull statistics may be dramatized. Sometimes it is necessary to conduct the prospect through a process of reasoning. It should be noted, however, that people frequently believe something without much reason because they wish to believe it. Sometimes an impressive statement which the prospect does not even understand convinces him of a product's superiority. There is a danger, however, that an alleged heroic test of the product may break down credulity. In presenting the items in the long-circuit appeal it is preferable to give first the want or the need followed by the solution in terms of the product. This is the order in which the associations normally operate. A rationalization appeal is a combination of the long- and short-circuit and may be conducive to permanent satisfaction.

There remains the further question of which appeal to use for a given product. It is found that the motives which are most effective in everyday life are not necessarily the most effective in advertising. Moreover, there does not seem to be any universally good advertising appeal. It is necessary to investigate each appeal with reference to the specific product.

There are some indications, however, that expensive articles require a long-circuit approach, and things more conducive to the welfare of the user can be handled by the short-circuit.

Adjustment of the appeal to the prospect is desirable. The vocabulary and the general ideas embodied in the advertisement should be considered with reference to his intelligence. Prospects of different degrees of intelligence may sometimes be located by noting the vocabulary and sentence structure employed in a particular advertising medium. Occupation also may be indicative. Further adjustments should be made to the interests of the prospects. Permanent interests may stem from vocation or avocation, and persons of such interest patterns may be located among the readers of trade journals and professional media. Once they are located, it is possible to sell them appropriate products, and the terminology used in general advertising may be adapted to their special lingo. It is the same story with reference to transitory interests. Minor adjustments with reference to age, sex, and geographical location are profitable.

23

CONTROLLING THE PROSPECT'S ATTENTION

Problems of Attention

UP TO THIS POINT we have dealt with techniques for appealing to the prospect and influencing him favorably toward the product. We must now consider how to use those appeals, and a major problem is to bring them to the attention of the prospect. If he does not attend to the advertisement, no matter how good the appeal may be, there is no sale. This problem of catching attention is more crucial today than it was years ago because of the tremendous increase of advertising material which stimulates an individual. Time was when the average family received a little four-page newspaper two or three times a week. Naturally, they read every word of it, including the advertisements. Now an advertisement in a metropolitan Sunday newspaper has to compete with hundreds of others. Hence, anything which can be done to give a particular advertisement a little advantage from the attention standpoint is of obvious importance. In the present context the term "attention" refers to the involuntary type. There are a few situations, such as in classified advertising, where the prospect voluntarily seeks the advertisement. In such instances the structure of the advertisement from the attention standpoint is of minor importance. The factors to be discussed in the present chapter are aimed primarily at the involuntary attention of the prospect.

There are certain characteristics of stimuli which normally do attract attention. One can scarcely resist the loud, bright, moving, unusual things in the environment. Some of these characteristics are mechanical in nature, such as a loud sound which overwhelms the sense organs and simply batters its way through to a person's attention. Other stimuli derive their attention value from interest and arousal of associations—

for example, a picture takes on meaning and reminds the reader of something else.

Size

It is simple enough to demonstrate that large things get more attention than small ones. This has been done by having subjects look through booklets containing letters of different sizes and then recall them. The general trend of greater recall for larger sizes does not help the advertiser very much. Granted that larger objects do catch more attention, he wants to know how much more. Specifically, if he doubles the size of his advertisement and pays about twice as much for it, will he get twice as much value from an attention standpoint? This problem can be approached empirically.

Experimental approach. A straightforward experimental approach to this problem has the subjects look through a dummy magazine (page 650) at their natural rate or else limits them to so many seconds per page and then conducts recall and recognition tests for the advertisements involved. Other experiments isolate the size variable more completely, such as one which employs a short-exposure apparatus to present a series of cards, each one containing four small colored squares. The color is merely to facilitate identification, and the different colors are rotated systematically through the different positions and the different sizes. On some cards all the squares are one inch in diameter; on others one square is one and a half inches; still others have a two-inch square. A card is exposed for a fraction of a second, and the subject reports what first caught his attention and also everything he saw. It is possible thus to determine the frequency with which a two-inch square of a given color in a given position is seen compared with a one-inch square of that same color in that same position. This method thoroughly isolates the effect of size on attention. The results show clearly that attention lags behind size as the latter increases. In some cases when the area is increased fourfold the attention is merely doubled and when the area is doubled, the attention goes up about 40 per cent. This suggests that the attention is almost proportional to the square root of the area. Certainly it does lag.[1] A similar trend was found in a study which recorded eye movements of a subject confronted with a full-page and a half-page advertisement. The first glance went to the full page 16 per cent more often than to the other, and during a ten-second period the time devoted to the full page was 23 per cent more than that devoted to the half page. Here again the larger advertisement did not get anything like twice as much attention as the smaller.

---

[1] For crucial experiments see Adams, H. F., *Advertising and Its Mental Laws*, pages 107 ff. New York: Macmillan, 1921.

Practical effectiveness of size. The foregoing results at first glance may be a bit disquieting. In spite of them there has been a very considerable increase in the use of larger areas in advertising. In 1910 in a typical popular magazine 10 per cent of the advertising pages were devoted to full-page advertising and this percentage increased consistently through the years until by 1930 it was 50 per cent. This trend suggests that the large advertisements were effective, and, moreover, numerous advertisers testify to this same point. This fact apparently contradicts the experimental findings mentioned above. However, the discrepancy is easily explainable. The larger advertisements which did prove so effective were better advertisements in other ways. In a large space one can do more and there is greater flexibility. It is possible to include a picture for which there might otherwise be inadequate space, or to use larger headlines, or to employ more white space and thus rely on isolation as a factor to catch attention. This means that if an advertiser buys an area twice as large as formerly and blows up his previous advertisement as one would enlarge a photograph, he will not get his money's worth. If, however, he takes the larger space as a challenge to make a better advertisement and do things which could not be done in the smaller space, then he probably will come out ahead.

Relative or absolute size. The question arises as to whether this superiority of larger space applies to absolute or relative size—whether a full page in a magazine with large format is better than a full page in a magazine with smaller format, everything else being equal. The results show clearly that the relative size is the important thing. Dummy magazines were made up in two different formats, one about half again as large as the other. Subjects looking through these under similar conditions had almost identical results in recall and recognition tests for the two formats. In a more extensive study advertisements were reproduced photostatically in black and white so that the areas were 50, 100, and 150 square inches. Three dummies were made up and the usual techniques followed. Some subjects did a little better on the small ones, and some a little better on the large ones, with the over-all differences comparatively small and of little statistical significance.[2] After all, the average reader probably spends the same amount of time per page regardless of size and it is therefore a matter of the competition between the different areas in the same medium.

[2] Newhall, S. M. and Heim, M. H., "Memory Value of Absolute Size in Magazine Advertising," *Journal of Applied Psychology,* 1929, 13, 62–75.

Inverse aspects. When one thing, such as a large area, attracts more attention to itself, it is done at the expense of other things. It is not a question of drawing upon an additional supply of attention but of distributing a certain total amount. In the experiment with colored squares in a short-exposure apparatus, it was possible to analyze the data in such a way as to determine the attention value of a small square on a page with only other small squares or on a page with larger squares. If the attention value of a one-inch square on a page competing only with others of the same size is taken as 1.00, then the value of that same small square on a page which is dominated by a one and a half-inch square is about .74, and if the competing area is two inches square, the value of the small one is only .65. This shows how the larger area gets its attention at the expense of the smaller one. This suggests that a quarter-page advertisement, for example, would be better off on a page with three other quarter-page advertisements than on a page which was dominated by a half-page advertisement.

Length of radio program. A somewhat analogous problem arises in connection with radio advertising. An hour's program, for instance, costs about four times as much as a fifteen-minute program, and it is a question as to whether it is four times as effective. One approach is to consider the size of the audience as revealed by interviews on listening habits and get an audience rating. In one study covering 1938 to 1941 the hour programs had a rating of about 3.4 times that of the fifteen-minute programs. If there was a direct relationship between audience size and length of program, this figure should have been 4.0. Similarly, thirty-minute programs were 1.7 larger in respect to audience than fifteen-minute programs, where 2.0 would have been expected.[3] This is not the whole story, of course, because it is possible that some of the longer programs were better constructed, and there is also the possibility of having the sales message repeated more frequently in the longer program. Even so, the indication of a lag is suggestive and in line with the previous discussion.

Size and repetition. The discussion thus far has dealt with the size of a single advertisement, but another possibility should be considered. Four quarter-page ads may be secured for approximately the same price as a full-page advertisement and it is possible that the smaller units may derive effectiveness from repetition. There is a well-known summation effect with repeated stimuli—for example, the torture technique of letting water drip on one region of the skin. The problem may be considered further whether the successive presentations are in the same issue of a magazine or newspaper so that they are observed, if at all, in quick succession, or whether they are in successive issues so that a considerable time elapses between presentations. Some empirical investigations on this point will be mentioned briefly. One of them employed what was essentially a dummy magazine with full-page advertisements appearing once, half-page advertisements twice, and quarter-page advertisements four times. The repeated advertisements for a given product were duplicates. The subjects looked through the magazine at a standard rate and then recalled what they could.[4] A portion of the results appear in the first columns of Table 41. The results are presented in relative rather than absolute terms. The recall score for a single full page is taken as 1.00, and the other recall scores expressed as a ratio to this. The two half-page ads averaged about .9, but it is to be noted that the quarter-page ad four times was better than the single full page. The repetition more than offset the small size of the individual advertisement, and the cumulative aspect was effective. Other similar experiments indicated that under certain conditions a small unit repeated was at least as good as the large unit once.

---

[3] Data from *Cooperative Analysis of Broadcasting. Cf.* Berrien, F. K., *Practical Psychology,* page 360. New York: Macmillan, 1945.

TABLE 41

Size and Repetition—Attention Value as Ratio to Single Unit

		Same Issue			*Different Issue*		
		Presentations	*Duplicates*	*Variations*	*Quarter Page*	*Half Page*	*Full Page*
1 page once	1.00	1	1.00	1.00	1.00	1.45	2.20
½ page twice	.91	2	1.49	2.62	1.22	1.83	2.73
¼ page four times	1.49	4	2.60	4.05	1.73	2.22	3.47

Another consideration is the introduction of some variation in the repeated advertisements. In the above experiment they were duplicates. In another study the small repeated units were varied somewhat, with a different picture or headline, but still promoted the same product. Some duplicates were also used by way of control.[5] The results appear in the central portion of Table 41. In the interest of simplicity the analysis is based on presentations alone rather than including size also. Each size appeared once, twice, or four times, but all sizes appearing once are grouped together, and similarly for the other frequencies. The column headed *Presentations* indicates the three possibilities of one, two, or four presentations. The next column gives the attention value for the duplicates, taking the value for a single presentation as 1.00 and the others as a ratio to this. The following column gives similar figures for variations and shows quite clearly the superiority of this latter arrangement. For example, four duplicate presentations, were only 2.6 times as good as a single presentation, but four varied presentations were about 4 times as effective as a single one. With duplicates the attention seems to lag behind the number of presentations just as it lagged behind size in the other studies, but with the variations there is no lag. Thus, there appear to be possibilities in the use of small repeated advertisements if a little variation is introduced. The first one makes some impression, and the second one supplements that but has an element of variety which arouses additional interest. An important consideration is whether the first small advertisement is sufficient to catch the attention of an adequate number of the readers. If it does, the second presentation builds on the impression that is already established. If the first advertisement is not observed, of course, the second must begin all over.

---

[4] Münsterberg, H., *Psychology and Industrial Efficiency,* Chapter XX. Boston: Houghton Mifflin, 1913.

[5] Adams, H. F., *Advertising and Its Mental Laws,* pages 226 ff. New York: Macmillan, 1921.

A variation of this procedure is to change the size in the repeated advertisements which creates a problem as to the order in which the different sizes are presented. For example, the first advertisement might be a half page, followed by two quarter pages—what might be termed an anticlimactic order; or the series might begin with the two quarter pages followed by a half page—a climactic order. This problem, too, has been investigated by the usual dummy magazine technique.[6] Combining all the results with each type of arrangement there was an 11 per cent superiority for the anticlimactic order. This seems plausible enough because the large initial advertisement would make a good play for attention which the others supplement, whereas a small one at the outset might catch no attention at all and leave no impression so that the larger subsequent one would have nothing on which to build.

The foregoing analysis dealt only with repetition in the same issue of a magazine where the subject would see the successive advertisements within a few minutes. It is a different story with the repetitions in successive issues. Four quarter pages a month apart evidently are not the same thing as four quarter pages in the January number. This was established by presenting dummy magazines at one month intervals. After each presentation, the subjects were given a test on the advertisements seen a month previously.[7] The results appear in the last three columns of Table 41. The value of a single quarter-page ad is taken as 1.00, and the others as a ratio to the value of that unit. The successive rows are for one, two, and four presentations as indicated in the third column. The results can best be appreciated by going across this section of the table diagonally, beginning at the upper right corner, to note what would happen with the same expenditure. A single full page has a value of 2.2, whereas two half pages rate 1.8, and four quarter pages, 1.7. Similarly, a single half page is 1.45 and two quarter pages 1.22. Thus, the same expenditure is less profitable when split into smaller units in successive issues. When a considerable time elapses between the presentations, the effect of repetition is not enough to offset the superiority of size. What is happening, obviously, is that the first impression wears off before the follow-up occurs. It is better to stake all on a large display which will get considerable attention in its own right, than to expect a small impression to persist for a considerable length of time. The experiment did not cover the situation where the issues are, say, a week apart, but much the same trend would be suspected there. Other experiments have traced the curve of forgetting after a brief impression, and usually in a matter of hours most of the forgetting has occurred.

---

[6] Adams, H. F., "The Effect of Climax and Anti-Climax Order of Presentation on Memory," *Journal of Applied Psychology*, 1920, 4, 330–338.

Size of type. An additional consideration regarding size involves the typography. In experiments where words or letters of different size are flashed, the subjects consistently report more of the larger ones. Granted that larger type secures more attention there is nevertheless a question of how far it is profitable to go in advertising. If the type gets too large it is impossible to say anything. The extreme case would be a single letter which filled the entire page. The historical trend with reference to type size is pertinent. In 1870 display type was about 24 point.[8] By 1910 the size had risen to about 48 point, and has not increased very much beyond that. Apparently, 48 point is about as large as it is possible to go and still present an adequate message. Another factor which will be discussed later is actual legibility as influenced by size.

---

[7] Strong, E. K., "The Effect of Size of Advertisements and Frequency of Their Presentation," *Psychological Review,* 1914, 21, 136–152.

[8] The conventional point system in typography figures 72 points to an inch. For example, 6 point type would set about 12 lines to an inch of printed matter, set solid, that is, with no additional lead between the lines. Similarly, 24 point type would run 3 lines to an inch, approximately.

Intensity

Visual. Intense stimuli attract involuntary attention largely by their impact on the sense organs. Anyone is attracted by bright lights or loud sounds. A check was made, for instance, on the proportion of passers-by who stopped to look in a store window related to the amount of illumination. With about 15 foot-candles of illumination, 10 per cent stopped, whereas with 100 foot-candles, 21 per cent stopped. The attention, obviously, was not directly proportional to the illumination, but at least the higher intensities did stop more people. A church increased the attendance at its evening service about 50 per cent by the simple expedient of putting a few bright lights out in front of the place. In the earlier days one could locate a certain chain of metropolitan restaurants five or six blocks away by virtue of the high illumination on the front of the establishment.

Auditory. It is much the same story in the auditory field. The common manifestation is a truck with a speech amplifier, making announcements or playing music interspersed with such announcements. This is the modern counterpart of the town crier and derives its attention value from the intensity of the stimulation rather than from its quality. Broadcasting from airplanes with a powerful amplifier is another instance. One of the earliest campaigns using this medium increased sales of a brand of cigarettes about 40 per cent in the South.

Psychophysical law. It should be noted, however, that the effectiveness of intensity as an attention device depends on the situation in which it is employed. Laboratory studies indicate that for one stimulus to be appreciably more intense than another, the actual physical intensity must be increased by a certain proportion. To make one sound perceptibly louder than another, it must be actually about one third louder in the physical sense. Similarly a light must be 1 per cent brighter. This is the so-called "psychophysical law." For the advertiser it means that he must consider the intensity of his device compared to the intensity of the background against which it is to be perceived. A speech amplifier downtown competing with all the traffic noises must have a high absolute intensity in order to add the requisite percentage to the background intensity. If illumination of a store window is to attract attention by its sheer intensity, much depends on whether it is located on a dimly lighted street or in the midst of other brilliantly lighted displays.

Motion

Moving stimuli attract a lot of attention even on the part of lower animals. The birds or squirrels will approach a person sitting quietly under a tree but at the slightest movement they scamper away. People gather to watch a moving window display or even a steam shovel. A telephone company observed passers-by, and 6 per cent stopped to look at the window display. The next day when the display was on a rotating table, the percentage was 45.[9]

Peripheral motion. If an advertiser is interested in problems of moving *versus* stationary displays, he should note the comparative sensitivity to moving stimuli of different parts of the eye. In the discussion of testimony (page 294) it was noted that the threshold for extension was much higher in the periphery of the visual field than in the fovea or center of the field, but that the threshold for motion in the periphery was not as high. In other words peripheral discrimination is quite effective if the stimuli are moving. This finding has obvious implications for the outdoor advertiser. If he has a location which is "head-on," he may be successful from the attention standpoint with a stationary display, but if his location is somewhat at one side where it is not directly in the fovea of the pedestrian or driver then it would be advisable to introduce motion into the display. Conversely, if he has a moving display, its location is not as critical as would be the case with a stationary display.

Moving pictures. From the attention standpoint the moving picture theater should provide a most effective advertising medium. The motion itself is a good stimulus to attention and the darkened theater and the absence of other stimuli tends to concentrate the attention all the more upon the screen. Unfortunately, it does not work out this way because of the attitude of the audience. This advertising medium is different from many others. A person can skip the advertisement in a magazine if he wishes and he can switch off the radio during the commercial. In the movies, however, he has to sit through the advertising and, having paid for entertainment, he is disgruntled. Except in small towns which have only one theater and no competition, it has proven difficult to introduce much advertising except previews of forthcoming attractions, which, after all, interest the audience because they are related to the amusement situation. The theater cannot trifle with good will to the extent of imposing very much advertising. Suggestions have been made from time to time to have commercial companies sponsor various pictures with a credit line the way they sponsor radio programs. In return for spending a few moments in listening to and observing the commercial, the audience might be admitted at a lower price, the sponsor paying the difference. Psychologically, there might be the difficulty that presently the public would fail to appreciate that the lower price was in return for the commercial and would become dissatisfied again at the interruption. There is some occasional surreptitious use of advertising in the regular films. The actor may hold a package of cigarettes so that the brand name can be seen, or a certain make of car may appear that many people will recognize.

---

[9] Anonymous, "Peeled Eye Department," *Printer's Ink*, September 29, 1932, 19, 15.

There are also educational films with an advertising slant. Some organizations prepare such films and lend them without charge to any group of people who wish to display them. Of course, a little advertising is included, but inasmuch as the loan costs nothing, there is no objection. For example, an electrical manufacturing company provides some films dealing with basic electrical principles and including a few credit lines. One of the gasoline companies puts out films showing the beauty spots of a region to which people may wish to drive, and incidentally tells them which gas to use on the trip.

Suggested motion. It is possible to present a picture on a printed page which carries some suggestion of motion. The wheels of a vehicle are streaked or a person's clothing flutters in the breeze. Even streaked letters in a headline give a suggestion of motion. However, there is quite a difference between an image sweeping across the retina and this mere suggestion of motion in a stationary picture. It does not touch such a fundamental biological level, but it does arouse some interest. One point should be observed in the interest of realism. The individual should be portrayed in what would have been a resting point in the real motion. In a picture of a person throwing a ball, it is better to show the arm stretched backward just ready to throw or just as the ball has been released, rather than midway. The reason is that an observer of a moving object sees it primarily at the resting points. He sees the player with his arm back and then sees almost nothing until the final pause after the ball is released. Thus, if those aspects are included in the stationary picture, it is more realistic.

Contrast

Contrasting stimuli make some claim upon attention. One aspect is size, for example, a large woman with a small husband. A frequent use of this in advertising is to show a large piece of machinery with a person beside it. In addition to attracting attention this also emphasizes the size of the machinery. Another instance is a large, modern locomotive beside an early prototype. Color contrast is another aspect. The maximum effect can be obtained by using the complementary or antagonistic colors. A red area makes the adjacent green appear a little greener and *vice versa,* thus enhancing the total effect. Brightness contrast is at a maximum with the black letter on the white page. A grayish background is not as effective from this standpoint. With reference to black and white typography, it is possible to use a reverse arrangement with white letters and black background. This involves the same amount of contrast, but the additional element of novelty. However, legibility must be considered and experimental results are unfavorable. One such experiment employed a speed of reading test comprising a page of short paragraphs, each of which contained one wrong word that the subject is supposed to check. Two forms of the test of equal difficulty were available. Form *A* was printed in ordinary typography and Form *B* in reverse. In a control experiment both forms were black on white. Subjects read the forms and marked the wrong words as quickly as possible. The reverse typography was read 16 per cent more slowly than the other, whereas with the control series, the difference between forms *A* and *B* was only 4 per cent.[10] The difference is presumably due to reading habits. Readers have been accustomed to neglecting the white field and concentrating on the black letters. If the arrangement is reversed, the habit of looking for the black portion interferes with reading. It would be possible to train people to read the reverse typography as readily as the other, but inasmuch as such training is not general, the advertiser will be at a disadvantage if he tries to say very much in reverse typography. Occasionally, it may be all right to set a very brief headline in reverse for the sake of novelty, but printing the entire advertisement that way would entail considerable danger that the reader would find it difficult and turn his attention elsewhere.

Another type of contrast involves a temporal aspect. The electric sign that flashes on and off intermittently is an instance. Repeated stimulation has a summation effect which is more intriguing than continuous stimulation. Contrast in meaning should be mentioned although it differs—it does not rely on a mere sensory effect but rather upon associations. Some advertisements contrast the Gay Nineties, when the product first was sold, with the modern era, featuring antique costumes or vehicles and their modern counterparts. Another instance is the before-and-after-using type of picture.

---

[10] Paterson, D. G. and Tinker, M. A., "Black Type *versus* White Type," *Journal of Applied Psychology,* 1931, 15, 241-247.

Isolation

An object standing out by itself with nothing else in the background attracts considerable attention. On the outskirts of almost any large city there is some electric sign all by itself against a dark sky. A small item in the center of a white page is quite arresting. Part of the effectiveness of the full-page advertisement lies in its having no competition on the same page.

Crowding the advertisement. There is always a temptation to put too much into an advertisement. Sometimes there are as many as sixteen different themes or appeals in a single advertisement—balloons, headlines, captions, subheadings—each one pertinent enough but together creating such a conglomeration that the reader may miss the point entirely. One reason for this difficulty is the limited range of attention. Experiments which expose different numbers of letters or digits for a fraction of a second indicate that half a dozen discrete impressions is about all that the average person can grasp in a single act of attention. The same type of experiment was conducted with isolated words. When five words were flashed, the subjects reported all, when ten words were presented they reported only 4.9, and when twenty-five words were presented only 4.8 were recalled. Thus, no matter how many were shown, the range of attention was about 5.[11] In another study some 400 subjects looked through the advertising section of a magazine for twenty minutes and then wrote down what advertisements they could recall. The results were tabulated according to the length of the headlines in the advertisements. Considering only full-page advertisements without pictures where the main reliance for catching attention was on the headlines, of those advertisements with less than six words in the headline, 34 per cent were recalled, and of those with six words or more in the headline, only 13 per cent were recalled. Obviously the longer headlines were less effective. A similar trend was found with the half-page advertisements.[12] Historically, there has been a definite trend toward shorter headlines. Fifty years ago only about a third of the advertisements had headlines of five words or less, whereas now the per cent is around 70.

The disadvantage of crowding the advertisement is related to the reader's attitude. The experiments just cited presented the material for only a fraction of a second assuming that the subject's attitude would be analogous to that of a reader hastily scanning a newspaper. Other experiments have been conducted in which the headlines were handed to the subject on slips of paper and he read them at his own rate. Under these circumstances, naturally, he recalled many more. It is probable, however, that the first type of experiment is more typical of practical conditions. Usually people skim through a paper rapidly looking at things here and there, and it is a question of what happens in that second or so which they devote to a given advertisement. There may be a little difference between newspapers and magazines. People are inclined to read newspapers more rapidly, whereas they sit quietly and relax with a magazine. The implication is that brevity of headlines and isolation in general would be more urgent in newspapers than in magazines.

---

[11] Starch, D., *Principles of Advertising*, page 403. Chicago: Shaw, 1923.

[12] Lucas, D. B., "The Optimum Length of Advertising Headlines," *Journal of Applied Psychology*, 1934, 18, 665–674.

Experiments on isolation. Extreme instances of isolation in a printed page occur now and then. A jewelry concern buys a full page and puts a small pendant or ring in the middle of it with the company name and nothing else. Another concern put a two-inch asterik in the middle of a large white page and a small footnote at the bottom of the page, giving the name of the concern and one brief selling point. The effect of isolation has been investigated quantitatively by the dummy magazine technique. There were some regular half-page advertisements, and the same half-page advertisements each centered in a full page, leaving half the page white—the white space added for isolation purposes was 100 per cent of the area of the advertisement itself. Under these experimental conditions, if the attention value of a regular half page is 1.0, the ordinary full page has a value of 1.4, but the full page with a half-page advertisement centered in it has a value of 1.8. The isolation was able to offset the usual lag of attention behind size (*cf.* page 689). The experiment was extended to include other increments of white space. The relationship may be shown most clearly by the diagram in Figure 22. The abscissa represents the per cent of additional white space and the ordinate the per cent increase in attention value (dotted line) or the additional cost (heavy line). The two curves cross at about 60 per cent white space. In other words, up to 60 per cent additional white space the attention value increases more rapidly than the cost, but beyond 60 per cent there is this obvious lag and diminishing returns.

Position

Position on the page. The location of an advertisement influences its attention value, and this variable subdivides into several aspects: position on the page, right *versus* left pages, position in the medium—which page—and the type of medium. The most crucial experiments on location on a flat page employ abstract material such as letters or single words

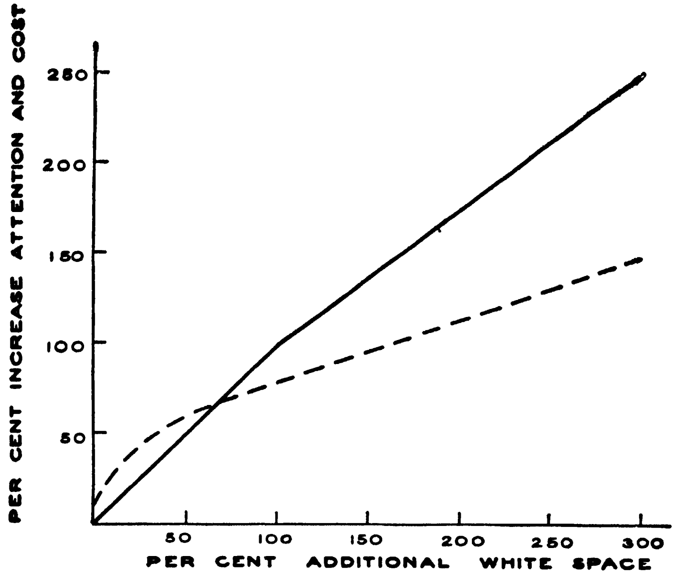


Figure 22. Effect of White Space.

located in different parts of a page and presented in a short-exposure apparatus for a fraction of a second. The subject reports what he sees first and then everything that he sees, and it is simple enough to tabulate the per cent of the time that each location is seen. The results of one portion of such an experiment appear in Table 42.[13] When there were eight capital letters arranged in two columns on a page, the upper left letter was seen first 86 per cent of the time, the upper right only 6 per cent,

TABLE 42

Position on Page *

	Percentage of time seen first	
Eighth-page division	86 4 1 1	6 2 0 0
Fourth-page division	81 13	4 2

* Adams

---

[13] Adams, H. F., *Advertising and Its Mental Laws,* page 93. New York: Macmillan, 1921

and the other positions still less. Similarly, with a page containing four letters, the upper left was the most effective 81 per cent of the time. Turning to other experiments, if the eye movements are observed when the subject is confronted with two advertisements, his first glance goes to the left over three times as often as to the right. These results are undoubtedly due to ordinary reading habits. Children have been taught to begin reading at the upper left portion of the page which habit carries over to the adult looking at advertising pages. If an experiment of this sort employs subjects who frequently read some other language which starts at the right instead of the left, they show the reverse tendency. There is also a tendency to look at the upper part of objects rather than the lower. In general, the upper parts of a building or an automobile are more interesting than the lower. Even in reading print, the upper parts of the letters are noticed more readily than the lower. This can be demonstrated by covering the upper and the lower portions of the words alternately. They are more legible when the upper portions are visible. The foregoing results were obtained with flat pages. The situation is different with a magazine in which the pages are bound together so that it does not break wide open. In this case the inner portions of the pages tend to be obscured so the upper outside portion of the page has the better value.

Right *versus* left pages. There is ample indication that the right page is superior to the left. In an experiment in which pages of a dummy magazine were turned for the subject, recall was 53 per cent superior for the right page. When the subjects looked through actual magazines and were checked for recall and recognition, the advantage of the right page was about 9 per cent for colored advertisements and 6 per cent for black and white. In an analysis made by Starch of data submitted to him by a considerable number of advertisers covering several million inquiries, he found that the inquiries from advertisements on the right page were about 14 per cent more numerous than from advertisements on the left page. A study of returns from advertisements of one product over a period of 15 years showed the same trend. Three samples were taken with a hundred or more insertions in each sample. In one of them the inquiry cost was $2.01 for left page and $1.75 for right. In another sample the corresponding figures were $1.97 and $1.78. The third sample, however, reversed the trend to the extent of $1.14 and $1.23, but it is to be noted that this last difference was much smaller than the others.[14] When people were interviewed on what they remembered having seen in certain issues of the *Saturday Evening Post* in 1939 and 1940, with respect to "visibility," of the advertisements in the top 10 per cent, 60 per cent more were on the right page than would have been expected if page position had had no influence. For the second 10 per cent, the figure was 26.[15] There is one possible source of error in results of this sort: the publishers might have given the right positions to the better known advertisers, whose advertisements might have been qualitatively superior and have had better intrinsic attention value.

---

[14] Roberts, H. P., "Influence of Position and Space Units on Inquiry Return," *Advertising and Selling,* January, 1939, 32, 44 ff.

The most plausible interpretation of the foregoing trend is the reader's habit of manipulating a magazine. Many people thumb through a magazine, keeping the right page broadside and the left somewhat at an angle. This was checked by observing numerous people reading magazines in waiting rooms and other places and noting just how they held the magazine.[16] In 14 per cent of the observations the right page was held broadside and only in 9 per cent was the left page broadside. The critical ratio was 3.0 which indicates that the difference was significant. The corresponding figures dealing only with advertising pages were 21 and 8 with a critical ratio of 4.1, indicating a still clearer tendency with such pages. To be sure, there are many people who do otherwise, but it seems that there are enough who manipulate the magazine in this fashion to account for at least some of the trend indicated.

Position in the medium. Another problem pertains to the actual location in the medium, that is, whether the advertisement is on the first page or the nineteenth. On the basis of conventional memory experiments it might be suspected that primacy and recency would be involved here. This suspicion is borne out by experiments with dummy or actual magazines. The results are clearer in magazines of the standard type with an advertising section, editorial material, and then another advertising section. Advertisements at the beginning and end of each section are recalled more readily than the intermediate ones. In the "flat" magazine—that is the one in which the advertising is to some extent mixed in with the editorial material—the trend is not so clear but, nevertheless, it is present. It is complicated by the presence of the editorial material with its varying claims upon attention. Some experiments have found that the inside covers and the pages facing them are 40 or 50 per cent better than pages in the middle of the magazine. Publishers are aware of this trend and charge more for the preferred positions. A point which sometimes is overlooked, however, is that the effect of primacy or recency extends several pages into the magazine from either end, and some pages in those locations, which do not have the higher rate, nevertheless get some additional attention value from their location.

---

[15] Baers, W., "Right Hand Upheld," *Printers' Ink*, March 7, 1940, 194, 69 ff.

[16] Stanton, F. N., *A Study of Magazine Reading Habits.* Unpublished.

Flats and standards. The method of making up the magazine is also of significance. In the old days the advertising was segregated into sections at the beginning and the end of the magazine. This is called the "standard" make-up. Then there arose the practice of sandwiching the advertisements in with the continuation of the stories. Inasmuch as this procedure was first adopted in magazines which were so bound that they would lie flat, this type of make-up came to be designated as "flat." The psychological problem is whether advertisements get more attention in one medium than the other. The usual argument of the publisher is that the reader will have to turn to page 48 to finish the story and thus will see the adjacent advertisement. A necessary qualification to this argument is the fact that getting the eyes on a page does not always insure attention. Everyone has had the experience of looking directly at a person without seeing him. By the same token, the reader who wants to finish the story and find out who's key is heard in the lock or whether they are going to make that dangerous turn on the edge of the precipice, is little concerned with the toothpaste and chewing gum in an adjacent column. It is a matter of conflict in attitudes. There is some experimental justification, too, for this qualification. Something similar to a dummy magazine was made up with some pages containing nothing but advertisements and others containing advertisements mixed with reading materials such as cartoons and jokes. Identical amounts of time were spent on each page, and the advertisements that were mixed with other reading matter were only 73 per cent as effective from the standpoint of recall as those which competed only with other advertisements on the same page. In another instance dummy magazines were made up with identical contents, some with the advertising segregated into two sections at the beginning and the end, and others with it mixed in systematically with the reading matter. The over-all results showed practically no difference in the percentage recognized in the two arrangements. At any rate, the presumed superiority of the flat arrangement was not demonstrated.

There is the further unsolved problem of what proportion of the readers actually turn to a certain page in a standard magazine. Once they get there, the probability of their paying attention to the advertisement is enhanced because of the absence of competition with possibly irrelevant material and resulting conflict of attitudes. The study of magazine reading habits revealed that the subjects at the moment of observation were looking at pages containing advertisements about 36 per cent of the time in flats, and about 18 per cent of the time in standards. Conceivably the latter group might have a sufficiently more favorable attitude toward the advertisements to offset their smaller numbers. This question cannot be answered definitely, but at least it is well to discount the alleged superiority of the flat arrangement. It is possible sometimes to modify the flat make-up so as to avoid the conflict in attitudes by placing the advertisement alongside of editorial material that is somewhat related. An advertisement about dress goods adjacent to the continuation of an article dealing with new styles would take advantage of a very natural transition from the editorial to the advertising material. There are cases where a manufacturer purchases space alongside his advertisement and puts related reading matter in that space hoping that the reading matter will serve as a stepping stone for the advertisement. Some magazines are broken into several sections such as style and beauty, or homemaking, or fiction. Advertising is then located in the section most closely related to it in interest. A similar problem is involved in the choice of a radio program for commercial sponsorship. A dance orchestra followed by announcements about cigarettes or sparkling beverages involves no appreciable shift in interest because the listeners are set for pleasure and relaxation, but when an oral antiseptic sponsors grand opera that is a different story.

Size of media. Another consideration in the selection of an advertising medium is its size and the resulting competition with other advertisements. The quantitative effect of this competition is easy to demonstrate. In one experiment dummies were made up containing twenty, forty, and eighty pages of advertising. Subjects went through these with a time limit which averaged three seconds per advertisement. In the smallest dummy they recalled 55 per cent, in the intermediate 40, and in the largest 29 per cent. These per cents represent essentially the probability of a given advertisement's being seen.[17] Another technique pointed to the same conclusion. People glanced through magazines with an interviewer and indicated what they remembered having seen. The study involved some 2,000 advertisements. In a medium which had about 60 per cent advertising and 40 per cent editorial content the "visibility" of the average advertisement was only 12 per cent, whereas when only about a fifth of the content was devoted to advertising, the visibility jumped to 30 per cent. The results are partly due to retroactive inhibition—that is, a subsequent advertisement interferes with the memory for a preceding one. It is possible to demonstrate a proactive inhibition also

---

[17] Starch, D., *Principles of Advertising*, page 796. Chicago: Shaw, 1923.

—that is, interference of an earlier advertisement with a later one. The net result is that an advertisement has a smaller chance of being perceived in a larger medium. However, the larger magazine usually is the one with the greater circulation so it is a choice between fewer readers with less competing advertising and more readers with more competition. It appears that the leading advertisers, at least, stake their investment on the medium with the large circulation. In that case it is all the more important to utilize all possible attention devices to give the advertisement an advantage over its numerous competitors.

Novelty

Mechanical devices. Novelty as an attention factor may take the form of some mechanical arrangement which arouses curiosity. Skywriting is a case in point, and so is the automatic vending machine which thanks the customer audibly for his purchase and repeats the slogan for the particular brand of cigarettes. Window displays often utilize this principle—for example, the table which rotates when a person holds his hand at a certain point on the outside of the window.

Stunts constitute another novelty device. A rug or a piece of linoleum is placed on the sidewalk in front of the store and after supporting a reasonable amount of traffic is cleaned and displayed in the window. A pair of rugged work shoes was frozen in a cake of ice and later exhibited to show that they still were soft. Every now and then somebody tosses a lawnmower out of an airplane and then cuts the grass with it while being photographed by the press. A manufacturer of overalls has been using stunts to prove their durability for 60 years. One was a tug-of-war with three men pulling each leg. Another employed the overalls as a tow line for an automobile. A fly-spray demonstration included squirting some on the demonstrator's own clothes as well as on the prospect's and then finally putting some in a bottle with live flies to show its lethal effect. A literal display of the product such as an awning sticking out from a poster board creates some novelty. An advertiser of appurtenances for dogs went so far as to install a small glass room in the middle of a poster board and have some pedigreed dogs live there. Some of these stunts merely attract attention, but others demonstrate some quality of the product in addition.

Clever phraseology. It often is possible to attract attention by means of some unsual turn of phrase. A New York department store which was featuring an infant department began an advertisement, "To the 343 babies who will be born in New York today." A wholesale concern dramatized the forthcoming salesman by a notice which resembled an advertisement for the return of a criminal, featuring his picture and some personal information. If the prospect was not disgruntled at being deceived momentarily, he would doubtless be watching for that salesman. In direct mail advertising it often is possible to give the item a personal touch which is somewhat arresting. Promoters of summer-resort real estate used a sales letter headed by a rustic sign pointing toward the "cottage of . . . (actual name of recipient)." Another circular had pictures of two bellhops talking about some person for whom the manager asked them to watch and in the balloon reporting their conversation the prospect's actual name was indicated. A magazine publisher sent individual prospects a typed letter which looked as though it had been pecked out with two fingers by the publisher himself. Incidentally, the question of personal *versus* form letters is a moot one for the direct mail advertisers. In one study of 5,000 such letters those which were filled in with the personal address yielded 2.8 per cent returns and the straight form letters 1.3 per cent. Apparently, one does appreciate the personal aspect.[18]

Exaggeration or absurdity. The case was cited earlier of a thousand-dollar Easter hat which packed them in. A jewelry concern advertised a blue diamond worth $300,000 and received a great many visitors. Occasionally, some town suffering from drouth actually runs an advertisement for rain, and manufacturers who contribute to the cost of the advertisement get a credit line. On the same motif, an Atlanta tailor issued rain checks which entitled the person to have his clothes pressed again free if it rained within twenty-four hours.

Timely tie-up. Advertising may well be geared to some other item that is receiving publicity at the moment. After a large metropolitan fire, dealers sometimes are quite successful in advertising fire extinguishers. If a polar expedition receives a lot of publicity, various companies call attention to the fact that their products were used on the expedition. The writer was once quite impressed by seeing a life-sized cut-out in a store window of two well-known movie comedians featuring a certain brand of pajamas, while directly across the street in the lights in front of the theater these same persons were featured in a current picture.

Typography. Many novel arrangements of typography are possible. The actual text of a portion of the advertisement may be set solid in a pyramidal shape. Gestures in typography are sometimes used. If the headline involves the word "bulges" the letters of that word actually bulge, or a statement about juggling may have the letters apparently being juggled. This device should not be used at the expense of legibility. A single word may be all right, but setting the whole advertisement in irregular typography slows down the reader so that he will not bother to complete the reading.

---

[18] Pope, E. B., "How Letters Can Be Tested and Accurate Forecast of Results Made," *Printers' Ink,* December 8, 1938, 185, 26 ff.

Decoys. One way to get people to do something is to let them see someone else doing the desired thing. This is the principle used in duck hunting. The owner of one of the early dime museums hired decoys who lined up at the entrance and then went out the back door immediately to line up again. One experiment investigated decoys as a method for getting people to stop and look at a window display. An observer counted the passers-by and the proportion of them who actually stopped and came up to the window. Then a decoy stood looking into the window while another count was made. In the control series 7 per cent of the passers-by stopped, with a female decoy 8 per cent stopped, with a male decoy 13, and with both decoys 26 per cent.[19] The experiment used only one individual of each sex, so some variation might be expected if other persons were used. The results did indicate, however, that the two were more effective than one, and suggest that the device had some possibilities.

General features. It is becoming increasingly difficult to arouse attention by means of novelty because the public is becoming accustomed to unusual things. Time was when everybody looked at every airplane that went over, but now many people ignore them. Similarly, the advertiser must employ considerable ingenuity if he is relying on novelty as an attention device. Moreover the novelty quickly wears off so that it is necessary to keep one step ahead of the public by continually devising new things. There is, too, the inadvisability of arousing curiosity and then having a serious letdown. For example, in advertising a forthcoming moving picture attraction, a little folder was put out which in large type had the words "Free Ticket. Admit One." On reading the finer print between the lines, one discovered that "This is not a free ticket but you will have to admit one thing, that (name of the film) is the most remarkable film. . . ." Being deceived in this way did more harm than good even though it did catch the attention.

Comic

Humor as a means of attracting attention is not universally successful or it would be used with greater frequency. Less than 5 per cent of the advertisements in current magazines attempt it. Some humorous campaigns have been a total loss. Some years ago a comic character was used in promoting a breakfast cereal. His antics were successful enough from the standpoint of attention, and his optimism was supposed to have been derived from the breakfast food, but the tie-up was not very clear and the cereal did not sell. On the other hand, Burma-Shave is reputed to have been very successful with its road-side jingles. In the first few years they more than doubled sales.[20] A fly-spray was quite successful with a humorous campaign. Persons pestered by insects constituted the humor, and the spray fitted in effectively as a solution of the difficulty.

---

[19] Nixon, H. K., *An Investigation of Attention to Advertisements*, pages 21 ff. New York: Columbia University Press, 1926.

Types of humor. Although various classifications of humor have been suggested, the only one that is of interest in the present connection is subjective *versus* objective. In the former the joke is on the reader, and in the latter it is on someone else. The most frequent instance of the subjective joke is the pun in which a word has two possible interpretations, and the reader gets the wrong one. The subjective type is quite frequently used in advertising as when a clothing store states, "We glove you truly," or a beer features "Shaeffers is bock again." The fly-spray advertising involved objective humor with the joke on the victim of the insects. A study was made of the effect of repetition on these two types of comic appeal. Jokes of both sorts were typed on cards, presented in a random order, and sorted by the subjects into ten piles on the basis of funniness. An over-all index for each type was computed by averaging all the subjects. The same jokes were rated in this way on four occasions a week apart and of course, the ratings decreased with repetition. The significant point was that the subjective jokes lost their flavor comparatively more rapidly than did the objective.[21] This result is in line with everyday experience. There is a characteristic groan which follows a pun. Therefore, if the advertiser proposes to use humor in copy which the same prospect will see repeatedly, it is better to make it objective rather than subjective in the interest of maintaining its flavor over a longer period. The result obtained from studio audiences pressing the red and green buttons indicated that situation comedy is better than gag comedy unless the gag happens to be very well integrated with the comedian's personality.[22] Situation comedy is primarily objective, whereas the gag joke may be on the listener. The general decrease of the effectiveness of any kind of humor with repetition is significant for the advertiser and is, perhaps, one of the reasons it is not widely used.

---

[20] Anonymous, *Advertising and Selling*, January, 1940, 33, 33.

[21] Hollingworth, H. L., "Experimental Studies of Judgment of the Comic," *Psychological Review*, 1911, 18, 132–136.

[22] Hallonquist, T., "Big Annie Goes to Work," *Advertising and Selling*, August, 1945, 38, 69 ff.

Social facilitation. It has been demonstrated that jokes are more effective when they are presented to persons in a group. Subjects rated mimeographed jokes according to a scale when they were alone at home or when they were seated in a group, and the jokes proved more amusing in the latter case.[23] The number of laughs per performance for a theater audience correlated with the number of people attending to the extent of .90—obviously a social facilitation effect.[24] The implication for the advertiser is the greater probability of social facilitation for his humorous message when he is using radio as compared with the printed page which is perused solo. The studio audience may enhance the humor for the individual listener.

Comic strips. The comic strips should be mentioned in this connection although only a few of them still have a humorous flavor. They are very widely read—by something like 80 per cent of adults and still more children. It is quite natural that the advertiser employs this treatment in his advertising hoping that it also will be almost universally read. Some of the earlier advertising efforts were downright deception and annoyed the reader. Now, however, it usually is possible to recognize whether the thing is an advertisement or not, and many people read it advisedly. According to investigations by the Gallup technique, advertisements using the strip presentation had an average visibility of 35 for men and 40 for women, whereas the formal type of advertisement had corresponding averages of 22 and 32.[25] One wonders whether interest in these advertising strips will continue unabated. Some of the present interest doubtless is due to the carry-over of habits from the other "funnies." It may be that this will continue indefinitely, but it is probable that unless considerable ingenuity is exercised in making the advertising strips interesting, they will lose some of their value.

General danger. Advertisers are cautious about their use of the comic. One large agency is so impressed by its uncertainty as to have a standing rule that humor will be used in no copy for any of their clients unless it is approved by the head of the agency. For one thing, the comic is likely to draw attention to itself rather than to the product, particularly if the picture is irrelevant. A picture of a clown standing on his head in the interest of breakfast food may not get very far. Another danger is that the levity may suggest that the advertiser is side-stepping more serious considerations. After all, business is serious. If the advertisement goes on to tell its story in legitimate fashion, well and good, but if it springs the joke and lets it go at that the reader may suspect that there is little else to be said about the product. Although humor functions quite successfully in advertising at times, on other occasions it may misfire. It should be handled with caution, and its effectiveness should be scrutinized carefully.

---

[23] Perl, R. E., "The Influence of Social Factors upon the Appreciation of Humor," *American Journal of Psychology*, 1933, 45, 308–312.

[24] Morrison, J., "A Note Concerning Investigation of the Constancy of Audience Laughter," *Sociometry*, 1940, 3, 179–185.

[25] Wiseman, M., "What is An Effective Layout?" *Advertising and Selling*, October, 1941, 34, 19 ff.

Color

Increased returns. Color has an obvious relation to attention in everyday life—witness the way children react to colored toys or pictures. The same principles operate in advertising. In 1910 in some typical journals about 5 per cent of the full-page advertisements were colored, whereas nowadays in some media the figure is 70 per cent or more. Although this increase is partly due to improvement in printing techniques and reduced cost of color, much of it reflects the fact that colored advertising has been effective and therefore the advertisers have kept it up. Moreover, there is plenty of data showing its effectiveness from the standpoint of returns. A seed company reports $9 in sales from their colored pages as contrasted with $1 for the plants advertised in black and white. A company that sells dress patterns discovered that when they color some particular model in their circular, they must prepare ten times as many patterns of that model. This does not mean that they sell more patterns altogether, but at least it does show the effectiveness of color. A colored envelope in mail order selling may bring a considerable increase in returns. One concern which received about 3 per cent of inquiries with a white envelope had almost 8 per cent with a blue envelope. Everything else was constant except the color of the envelope. In the retail field a dish mop with a colored handle will sell for ten cents when a plain one cannot be sold for five cents. Sometimes it is necessary to put the colored ones away while the plain ones are unloaded. In a survey by the usual technique of interviewing persons on what advertisements they remembered having seen, a black and white page had a visibility of 31 per cent and a four-color page, 50 per cent.[26]

Different hues. It is obvious that color is an important variable in attracting attention. There is a further question as to the comparative effectiveness of the different hues. If there is a hue that has high attention value for everyone, the advertiser should contrive to use it. In experiments dealing with this problem it is important to control the effect of brightness. The subject may react favorably to a certain yellow not because it is yellow but because it is bright. One such experiment attempted to control this factor by having each color appear in different degrees of brightness throughout the series.[27] Uniform patches of color were presented in a short-exposure apparatus, and the data were tabulated according to which colors were seen first. Orange was seen first 21 per cent of the time, and red was in next place at 19 per cent. This slightly higher attention value for the red end of the spectrum is plausible, for other studies indicate that red appears somewhat nearer. If two patches of color are adjusted so that they seem equidistant, the subject tends to set the red farther away than the blue, which indicates that it has greater apparent nearness.

---

[26] Kaufman, H., "How Effective is Color?" *Advertising and Selling*, November, 1941, 34, 38 ff.

The results are not striking enough to warrant the use of colors toward the red end of the spectrum when other considerations are paramount. A picture of the package should show its natural color in order to facilitate subsequent recognition. The color of grass and trees in pictures obviously should conform to the actual objects. But there are situations in which an area of color may be used in an advertisement just for its attention value and nothing else.

Typography. If colored type, or a colored background, or both are to be used to attract attention, there is the further question of legibility. If a certain combination of letters and background is difficult to read, the value of color may be lost because the reader will not bother to struggle through the text. Numerous experiments have been conducted on this particular point.[28] It is a matter of brightness contrast between the letters and the background. It makes little difference whether dark blue is on light yellow or light blue is on dark yellow, the important point is that one is light and the other dark. The ordinary black and white printed page, of course, gives a maximum brightness contrast. However, typography can be selected that has considerable brightness contrast between type and background and still comprises enough color to attract attention. Some printing stocks are slightly tinted, and ordinary black type on these stocks does not lose legibility appreciably because the stock is still very light and there is adequate contrast. Another question is the way the color is used in the advertisement, for example, coloring the trade name, or the product, or just the background. When a short-exposure and recognition method was used, it developed that there were comparatively slight differences in this respect provided that the areas involved were the same.[29] The important point, however, is the actual area involved. In another study where the attention value was correlated with the measured area of the colored portion of the advertisement, the coefficient was .41 which indicates some relationship. Evidently the way the color is used is not as important as the actual amount of color.

---

[27] Adams, H. F., *Advertising and Its Mental Laws*, page 117. New York: Macmillan, 1921.

[28] For a general summary see Tinker, M. A., "The Effect of Color on Visual Apprehension and Perception," *Genetic Psychology Monograph*, 1932, 11, No. 2.

Color preference. The discussion thus far has dealt with color solely from the standpoint of attracting attention. It is a good idea to consider the aesthetic aspects of color use. Anything that makes an advertisement attractive tends to prolong the time devoted to it. If the advertisement is artistic or aesthetically attractive, the reader will linger long enough to get the complete message. In other cases, too, it is desirable to make the advertisement attractive because of the artistic nature of the product. It would be very nice for the advertiser if there was some particular color that everybody liked. Then he could use that in his display and be certain that most of the prospects would find his advertisement agreeable. Unfortunately, the results do not reveal this universally liked color. Numerous experiments have been conducted in which a group of subjects were given a series of colors and asked to rank them in order of preference or otherwise evaluate them aesthetically. If studies of this sort are compared, the results are completely inconsistent. It is perfectly possible to find one investigation in which blue was the color most liked by the subjects involved in the sample and to find another investigation where blue was near the bottom of the list and red was at the top. Or again, it is probable that pleasant colors would be used in connection with pleasant occasions so that colors used at weddings, for example, would be pleasanter than those used at funerals. Historically, however, the same color has been used on both types of occasions. As a matter of fact, color preferences are largely an individual matter. A person becomes conditioned to a certain color by having experienced it in some particular setting. Perhaps he likes red because it reminds him of a sunset which accompanied some pleasant experience. Another person might like blue because of its association with certain blue eyes. The individual is quite stable in his preferences. If a subject arranges a series of colors in order of preference and then repeats the same experiment months later, he reproduces practically the same order. An average correlation of .84 was obtained between rankings of colors made a year apart by a group of subjects. Thus, the individual is stable in his preference, but his preference is different from that of another individual. There just are no colors which are universally liked. There are, to be sure, trends in colors which are most frequently involved in certain kinds of purchases. Manufacturers will testify that they sell more rugs and carpets that are in rose, light gray, or light blue and that they sell more kitchenware which is white with a red trim. But even such trends change with time, much as fashion changes.

---

[29] Brandt, E. R., "The Memory Value of Advertisements," *Archives of Psychology*, 1925, 13, No. 79.

Atmosphere. It is possible that colors may carry specific meaning or create a certain atmosphere. Some writings on the subject are replete with lists of qualities suggested by various colors. The possibility was noted earlier that red may have a slightly dynamogenic effect (page 541). Systematic experiments in which colors are presented and subjects are required to match them with various qualities do not yield clear results except in a very few cases. There is general agreement among subjects on temperature associations. The red end of the spectrum does seem a little warmer, and the blue end cooler to most people. There is sufficient unanimity to be worth the attention of the advertiser. It would indicate more red in a display for blankets or heating appliances where a suggestion of warmth was desirable and conversely a bluish motif for cooling beverages. There are also consistent indications that the darker colors appear heavier so that it would be better to have darker areas below in a combination of colors in order to avoid a top-heavy effect. A darker color on the package might make it appear heavier for the benefit of people who did not bother to read the weight on the label. The psychologist hesitates to go beyond the foregoing variables with references to atmosphere suggested by specific colors.

Pictures

General results. Although "a picture is worth a thousand words," according to the Chinese proverb, much depends on the picture and the words. Illustrations do constitute an effective device for attracting attention and have an almost universal appeal. Children have their picture-books and the pictorial type of magazine is popular with adults. Moreover, a picture can present a lot in a very small compass. If an advertiser is attempting to portray the panorama from the windows of the summer hotel which he is advertising, he can do so more effectively by hiring a photographer than by hiring a poet. Again, a technical description is much more intelligible if supplemented with a picture or a diagram. It would be difficult to explain the operation of a worm gear without a diagram including arrows.

Pictures attract much attention and can accomplish a lot in a short time. Instances could be multiplied in which the introduction of a picture into an advertisement produced a marked increase in sales. Small advertisements for a watch were run with and without a picture of the watch. The former secured 124 per cent more inquiries and actually sold 33 per cent more watches. Letters in a direct mail advertising campaign pulled 16 per cent replies, but when a cut or picture was at the top of the letter, they pulled 29 per cent.

Kind of picture. A further question is whether some types of pictures are more effective than others in attracting attention. A profitable classification is on the basis of pictures of people as opposed to objects. When two advertisements were presented simultaneously, one with the picture of a person and the other with a picture of an object, and the eyes of the subject were watched for a ten-second period, 49 per cent more time was spent looking at the picture of the person. Similarly, in an experiment in which subjects were driven in an automobile by a series of poster boards and then subsequently checked for recall and recognition of the advertisements on those boards, they recalled 39 per cent of the advertisements with pictures of objects and 67 per cent of those with pictures of people. The corresponding figures for recognition were 37 and 48 per cent.[30] In a number of typical magazines in 1900 some 60 per cent of the illustrated advertisements showed people, whereas by 1940 this per cent was up to 80.[31] The same investigation showed a marked increase in the use of relevant pictures.

Photograph *versus* drawing. There is a problem as to the comparative merits of advertising pictures made originally from drawings and those made from photographs. Pictures reproduced from photographs were about 10 per cent superior to those made from drawings in the dummy magazine technique.[32] A report on the experience of two advertisers points in this same direction. One of them ran a strip with six photographs and the next year a similar strip with six drawings. The photographs had an observation value (interview technique) of 45 per cent and the drawings, 34. Another advertiser had corresponding figures of 47 and 39 per cent.[33] Data are not available on the statistical significance of these differences. The only suggested explanation for this finding is that the photograph appears more natural and catches attention because of this realism in the same way that a living model is more interesting than a dummy. A drawing has the possible advantage of idealizing the product and making it look even better than the natural object, but with perfection of photographic techniques, this advantage is disappearing. Authorities still differ in their opinions on this point but available experimental evidence favors the photographic method.

---

[30] Burtt, H. E. and Crockett, T. S., "A Technique for Poster Board Advertising," *Journal of Applied Psychology,* 1928, 12, 43–55.

[31] Klapp, O. E., "Imitation Value in Advertisement," *Journal of Applied Psychology,* 1941, 25, 243–250.

[32] Adams, H. F., *Advertising and Its Mental Laws,* page 301.

[33] Tasker, G. W., "Drawing *versus* Photograph," *Printers' Ink,* January 22, 1943, 202, 18.

Relevancy. Although pictures of people are more effective than pictures of objects, the situation is encountered occasionally in which the picture of the person is not very relevant. There is a danger, in such a case, that the reader may look at the picture and miss the point about the product itself. There was an era in which it was thought that the only thing necessary in order to make an advertisement click was to include a picture of a pretty girl. This assumption often misfired. One notable case was a manufacturer of stationary gasoline engines for agricultural use. In his advertisement he ran a picture of the engine with an attractive young lady standing beside it. The readers looked at the lady and did not see the engine at all, and there were no sales. There is also experimental evidence on this point. From the sheer attention standpoint there appears to be little difference. When two advertisements were presented simultaneously, one with a relevant and the other with an irrelevant picture, and the subject's eye movements were observed, it was found that the distribution of fixation was about fifty-fifty; in other words, the irrelevant picture was not inferior to the relevant. It seemed to be a matter of which picture had intrinsic attention value. The situation was quite different, however, when, instead of simply noting fixation of the pictures, a test was made of ability to recall the *product* advertised. The dummy magazine technique was used with advertisements containing relevant and irrelevant cuts. The results are summarized in Table 43. The attention value of the relevant pictures is taken as 100 per cent

TABLE 43

Recall Ratios for Irrelevant *versus* Relevant Pictures *

	Irrelevant Pictures	*Relevant Pictures*
Recall of trade name		
Dummy *A*	29	100
Dummy *B*	38	100
Description of Advertisement		
Dummy *A*	28	100
Dummy *B*	80	100

* Laslett

(last column) and the corresponding per cents for irrelevant ones appear in the other column. In three out of the four series with irrelevant pictures the subjects were unable to recall the trade name or describe the product with anything like the degree of proficiency they manifested in the case of the relevant pictures, and in the fourth series the inferiority was 20 per cent.[34] What it amounts to, then, is that the irrelevant picture catches attention just as readily as does the relevant one, other things being equal, but from the standpoint of making the prospect remember the product or the trade name, the irrelevant picture is distinctly inferior.

There may be situations in which the advertiser is anxious to use an irrelevant picture because it has some striking element of novelty which gives it pronounced attention value. In such a case it is important to tie in the picture with the product as quickly as possible. For example, a toothbrush advertisement ran an arresting picture of a pig operating a typewriter. In the first portion of the text, a transition was made to the effect that the pig was writing for a new job because they didn't need his bristles any more now that a new plastic type had been developed. The reader presumably got as far as the plastic bristles before leaving the advertisement. If it is possible, in this way, to make an almost immediate transition, the benefit of the irrelevant picture, which has good attention value, may be salvaged.

There are cases where a relevant picture is used but the text, which is also relevant, goes off in a different direction. This arouses an unfortunate conflict in attitudes. For example, a piano advertisement pictures a young couple sitting on the bench with cupids up in the background and the obvious lead is romance. The text, however, immediately discusses the sonorous tone of the instrument. It would be much better to start off on the romantic aspect and make a transition to the tone. A picture of an automobile parked at a swanky country club with a swimming pool in the foreground naturally suggests something about the kind of people who use this car. If the text begins about carburetors and spark plugs, there is a clash with the attitude aroused by the picture. Thus, it is desirable to insure a certain harmony between the text and the cut.

Mechanical *versus* interest incentives. Some of the foregoing attention devices are mechanical in their action, whereas others depend more upon interest and the arousal of associations and meanings. The question arises as to the comparative merits of these two general types. Ten advertisements which had been recalled with high frequency in a dummy magazine experiment and ten at the other extreme were selected.

---

[34] Laslett, H. R., "The Value of Relevancy in Advertisement Illustrations," *Journal of Applied Psychology*, 1918, 2, 270.

A group of experts analyzed the different attention incentives involved in each advertisement, noting especially whether they were of an interest or mechanical type. There proved to be a preponderance of interest incentives in the better advertisements. Similar results have been obtained in other studies.[35] These results appear plausible. From a sheer attention-getting standpoint the mechanical device may be entirely satisfactory. The interest incentive, on the other hand, not only secures attention but goes beyond and links the product up with the individual's earlier experiences so that he may be better able to recall the advertisement or the product at a later time. After all, the advertiser does not wish merely to catch attention but strives to leave an impression so that subsequently the prospect will respond favorably to the product.

Holding Attention

The discussion up to this point has dealt with mechanisms for catching the reader's attention. This process may be insufficient because even though he stops momentarily he immediately goes on to something else. The average reader skims the pages quickly. It is characteristic for attention to fluctuate. If one listens to a faint stimulus such as a watch held at arm's length, it comes and goes as the attention shifts. A diagram with ambiguous perspective looks like an ordinary staircase or a staircase as seen from beneath. If one observes it steadily the different impressions shift back and forth as attention fluctuates. So this characteristic fluctuation would tend to lead the reader away from the advertisement that had stopped him momentarily. Therefore, it is important to consider devices which may hold the attention as well as those which attract it.

Unity

One device for holding attention is to give the advertisement inherent unity. If the ad all hangs together, it is more difficult for the reader to break away. Sometimes this may be achieved by the simple expedient of a border. This offers a hurdle for the eyes to clear in getting out of the advertisement once they have been attracted inside it by some other device. The tendency for intervening lines to arrest eye movement can be seen in the common illusion in which two lines of equal length are presented but one of them is cross-hatched. The latter appears longer to a naïve subject. As the eye sweeps along the line, it is held up by each little cross line, and the greater total kinesthetic experience is translated into an overestimation of the length of the line. The same principle operates in a border which presents a slight handicap to the eye movement and thus makes it more probable that the eye and the attention will remain inside the advertisement. Another possibility is the use of pointers and other devices which have a directional component. People have been conditioned to follow arrows and therefore a series of them leading toward the center of the advertisement will tend to pull the reader back if he starts away. It does not have to be an actual arrow. In an advertisement for pens or pencils a number of them were arranged with their points toward some central feature. Faces operate similarly. Several people are looking at the product in the center of the advertisement and whenever the reader starts to leave the page, he encounters somebody else who is looking back into it and is inclined to do likewise.

---

[35] *Cf.* Hollingworth, H. L., *Advertising and Selling*, page 129. New York: D. Appleton, 1920.

Pleasant Feelings

Lines. Another set of factors that contribute to holding the attention center around the general relation between feelings and attention. It is a common experience to want to continue pleasant things and to get rid of unpleasant ones. Thus, if the advertisement is pleasant, the reader is more inclined to stay with it. This is one justification of art principles in advertising. A number of aspects of line and form have some feeling component that may be significant in the present connection. Take for example, the matter of simple lines. There are numerous claims of qualities suggested by different kinds of lines, but only two or three are of sufficient universality to be of value to the advertiser. Horizontal lines tend to suggest quiet and repose, perhaps because of association with the fact that persons do their resting in a horizontal position. Considerable reaction to the aesthetic involves empathy, that is, a tendency to feel oneself into the situation. While viewing a landscape, for example, a person may project himself into it and feel himself walking under the trees, or while watching a drama, he may feel as though he were participating. By the same token he may feel himself into the horizontal line, that is, imagine he is horizontal and relaxing. In addition to the repose of the horizontal, there is the action that seems to go with diagonal lines. This stems from the fact that some diagonal lines usually are obvious with persons in action. These tendencies may be useful in creating a certain feeling that is appropriate to the advertisement. It would be inappropriate to present a picture of a bed or a mattress in a diagonal way, but diagonal elements in a display for sparkling beverages or dance records are entirely fitting.

Forms. The same principles operate with closed forms. A triangle, obviously, can never be placed so that it does not involve a diagonal line and thus it tends to suggest action. The square may carry more of a suggestion of solidity because it has the repose of the horizontal and the stiffness that goes with the vertical. There is a further problem of the actual proportions of a rectangle; one that is absolutely square or several times longer than it is broad is less agreeable than one of some intermediate proportions. The experimental approach is to present rectangles of the same area but different proportions two at a time, and the subject always indicates which one of the pair he prefers (paired-comparison method). The results quite consistently favor the rectangle with the approximate dimensions in the ratio of three to five. Much the same principle operates with reference to the division or section of an area or line. If a vertical line is cut by a small cross line, and the two portions are in this same ratio, the section is more agreeable. This arrangement has been termed the "golden section," presumably harking back to an era when anything which was good was termed golden. There are obvious implications regarding the proportions of a rectangular panel in an advertisement. Again a single column of text set solid might be unpleasant just by virtue of its proportions. It is possible to break it into several smaller blocks of type with space between them, each roughly conforming to the golden section.

Other Art Principles

A few other art principles are pertinent and sufficiently well established to have a bearing on advertising layout. Balance is one of these. A large mass on one side of the advertisement that is not balanced by something on the other side is a bit unpleasant. Empathy may be involved—an impulse to go in there and rectify the lopsidedness. Balance also operates somewhat on the lever principle with a large mass nearer the center being adequately balanced by a smaller one farther out. Again, a small, interesting object will balance a larger, less interesting one. The same point should be watched in a vertical direction. A large object toward the top with nothing balancing it below creates a top-heavy effect like a pyramid standing on its point instead of its base. If, however, the large mass at the top is something which, in itself, is very light and ethereal such as fleecy clouds or delicate flowers, it does not appear top-heavy.

It has been demonstrated that art principles are not as remote from the man in the street as it might seem. A series of pen and ink sketches were prepared which treated each subject in five ways: (1) a perfect picture, (2) a violation of unity with the picture split in two centers of interest, (3) a violation of harmony with conflicting and irrelevant lines,

(4) a violation of proportion, for example, lack of balance, and (5) a violation of congruity such as star-shaped flower beds in a natural landscape. The pictures included such things as landscapes, skyscrapers, and peasant life. The five treatments of each subject were presented to a person simultaneously and he was asked to rank them on the basis of feeling. Some art students participated in the experiment, but the majority of the participants had no art training. Combining the results of all the individuals and all the sketches, the "perfect" study was selected for first place about 50 per cent of the time, whereas by mere chance it should have been chosen only 20 per cent. The violation of congruity was ranked in last place 42 per cent of the time. There was little difference between individuals with and without art training.[36] Thus, it is a good idea for the advertiser to conform to some accepted art principles in his layout on the assumption that his prospects will be responsive to them even though they have not had training in fine arts.

Imagery

In addition to considering the feelings aroused directly by the advertisement itself, it is profitable to consider those aroused indirectly by things which the advertisement suggests. In everyday experience one item brings to mind another by a process of association—the photograph calls up the original person or the strain of music brings back memories of school days. This imagery has much to do with the emotional reaction to the whole situation. If the experience reminds him of something pleasant, he will continue to think about it favorably. But if an advertisement arouses unpleasant imagery, the reader turns to something else.

Words. The actual words used in the copy may convey imagery, and the direction in which they take the reader is quite important. The mere phonetic composition of the words is often a factor in the arousal of feelings. Many people find words like Ivory, Domino, Sapolio agreeable, whereas Whiz, Tiz, and Squibb are less pleasing. Then there are the onomatopoetic words like sputter, chatter, giggle, hiss, which imitate natural sounds. A summer resort suggests that the reader get away from the "shriek of whistles, the bang and clang of the trolleys, to the restful vistas of green fields and babbling brooks." Investigations have been made of the feeling tone of different sounds quite apart from any meaning, by using nonsense syllables like nep, paz, zif. A paired-comparison technique revealed that the sounds *l* and *r* and to a lesser extent *t* and *d* are pleasing, whereas the gutterals like *g* and *k* and also to some extent *c* and *s*, are at the unpleasant end of the scale.[87] In another experiment using actual words the combination that seemed most pleasing just from its phonetic make-up was "cellar door." This involves the *l* and *r* mentioned above. An unpleasant feeling may also be aroused by mere difficulty of pronunciation. This may be caused in part by a feeling of inferiority at not knowing how to pronounce the word or fear of embarrassment if someone detects the mistake. A customer goes into a drugstore after Baume Analgesique Bengué and comes out with Absorbine Junior, because he was afraid to try his French on the clerk. Mr. Ghiradelli who manufactured chocolates under that trade name, is reputed to have said that the "h" in his name cost him a million dollars because of the confusion in pronunciation and consequent hesitation to use the name.

---

[36] Aust, F. A. and Harrison, R. S., "The Values of Art in Advertising," Menasha, Wisc., *Banta,* 1931.

Another aspect of the imagery of words lies in their literary usage. Calling a horse a "steed" or candy a "sweetmeat" suggests the age of chivalry when those words were current and brings up corresponding imagery. If romance is appropriate to the product advertised, it should be used, but it would be unwise to mention a steed hauling a mowing machine.

The actual meaning of a trade name has possibilities of subtle association and imagery. "Moonglow silk" arouses a much better picture than "Skinner's Satin." "Pall Mall" and "Lord Salisbury" carry more pleasant associations than "Camels" or "Bull Durham" or "Mule-Kick." If "Ivory Soap" had been called "Animal Grease Soap," which would have been appropriate enough technically, Procter and Gamble might have gone out of business. Trade names sometimes make obvious efforts to arouse appropriate imagery by calling something "Royal" or "Premier." Euphemisms work in this same fashion; pool rooms are "billiard rooms"; the second-hand tire is a "reconditioned" tire; the propagandist or press agent is a "public relations counselor"; and the fat woman is the "stylish stout."

The text of the advertisement also may be designed with a view to arousal of imagery. A perfume "flecks every moment with gold." Advertisers still talk nostalgically about the classic series for the Jordan Automobile. For instance: "The vagabond days have come. One happy mystic day in June, when the soft green of early summer is kissed by the golden sun, forget the town, its turbulence and fame and bid the world goodbye. Idle the twilight hours away in a Jordan, light-footed, silent, flying, free—companion, chum, camp-follower of Spring. This nimble car of fascinating ease scuds through the large and solemn world, making one golden hour outmeasure a long drab year." An epicurean advertisement for caviar tells how "people eat it in silence and with half-closed eyes while the servants instinctively tiptoe about the room unwilling to break the ecstasy." Similes and metaphors likewise contribute. A flooring material is reinforced "with an intimate cobweb of minute gossamer fibers," or a linoleum "hugs the floor."

---

[87] Jones, E. S., "Letters and Syllables in Publicity," *Journal of Applied Psychology*, 1922, 6, 198–204.

The radio advertiser has a special problem of arousing visual imagery from the words which he presents because he cannot, as in other media, supplement his copy with actual pictures. The popularity of many musical programs which feature songs of twenty or thirty years ago may be traced to the imagery and memories aroused by such music. Middle-aged folks, hearing music which was popular in their hey-day, relive again the first kiss in the moonlight or the Junior Prom.

Pictures. It is even more important for pictures presented in the advertisement to be carefully scrutinized from the standpoint of possible associations which may be aroused. Because the picture is more complex, it may set up a greater variety of associations with different readers. The advertiser may select a picture which reminds him of one thing, but is likely to remind other people of something else. A picture of his grandchild may appear "cute" to him but to the other readers it looks like a chimpanzee. Imagery aroused by pictures is especially critical with reference to food advertising. Sometimes a picture designed to reinforce some selling point completely misfires. When sealed packages first came out, one manufacturer wanted to impress people with the fact that the seal really did exclude the bugs from the crackers, so he ran a picture of a package with vermin all crawling on the outside. The difficulty was that although the bugs did not get into the crackers they nevertheless got into the mind of the reader. A still more unfortunate instance was the following, with appropriate illustrations, in an advertisement for a foundry: "Surgeons and butchers both cut meat. All foundries melt metal. This company is to the foundry what the surgeon is to the butcher." Unpleasant imagery aroused by the pictures in the advertisement may work against the product itself because feelings aroused by one thing are apt to be transferred to something else which is associated with it.

Quite apart from printed advertising, similar principles may operate with reference to the display of the product. An unpleasant, muddy-looking package may deter some purchasers. A bakery was displaying its doughnuts in cellophane wrappers, hoping to arouse some food interest. The sugared doughnuts, however, soon looked messy. Thereupon the sugar was placed in a separate container within the envelope, so arranged that by pulling a little tab and shaking the package, the purchaser could sugar his own doughnuts when he was ready. Thus the product maintained its pristine appearance for a longer period.

It is possible to select pictures designed to bring out imagery in any particular sensory mode. The coolness of the ginger ale is suggested by an Eskimo in the display. Mentholated cigarettes feature pictures of daisies, the Old Oaken Bucket, or even penguins. To arouse smell imagery, the picture shows steam rising from a cup or a person holding a cake of soap to his nose with a pleasant expression on his face. In the auditory field persons or animals are shown listening intently. Sometimes an advertisement is spoiled by the imagery aroused by an adjacent advertisement. The writer once saw an advertisement for Jell-o alongside an advertisement of a cure of eczema. Unfortunate coincidences of this sort are less apt to occur in magazines that make a definite effort to divide the magazine into several sections according to editorial content. The advertiser should not be content with considering the immediate impression created by the advertisement but should think beyond to the associations and images which it will arouse and the direction in which those will take the reader.

Typography

A final consideration from the standpoint of keeping the prospect's attention is the typography used in the advertisement. If it is difficult to read, the prospect will turn to something else unless he has some ulterior interest in the matter. Sometimes a very slight difference in legibility will make the difference between turning the page or continuing to read the advertisement. Problems of typography can be studied quite objectively under laboratory conditions. A specimen may be moved in from a distance until the subject can read the letters, and the maximum distance is an index of legibility. Or the minimum amount of illumination under which he can read the material may be determined. There are devices which throw a specimen in and out of focus without changing its size or general brightness. Many studies have been made using a short-exposure apparatus to flash a word or phrase for a fraction of a second. Finally, speed of reading gives an index of legibility (*cf.* page 161).

Type face. The advertiser has a considerable variety of type faces or styles of type available. They vary in the general heaviness of stroke, differences in the width of the stroke within the letter, absence or presence of serifs, and different shapes of serifs. Experiments have set words, or letters, or text in different faces and employed some of the foregoing techniques. The general principle coming out of such studies is that the most legible type faces have uniformly fairly heavy strokes. It is plausible enough that a good, black letter should be seen more readily than a thin one. Moreover, the type faces that combine light and heavy strokes in the same letter have the difficulty that certain strokes are visible, but without all the strokes the impression is ambiguous. For example, the capital letter *N* with a heavy diagonal and two light vertical strokes, is seen primarily as the diagonal. This diagonal, however, could just as well be part of *V, W, M, or A.* This result does not mean that the advertiser should go the whole way and set all his copy in heavy block letters, but within the range of type faces which are acceptable enough from the aesthetic standpoint, there are still plenty of possibilities where the letters are heavy enough to be reasonably legible. Italics, or script, or Old English, of course, are distinctly less legible than the ordinary Roman type face.

Upper and lower case. The use of capitals as opposed to small letters is sometimes a moot question in advertising layout. Capitals are often used for emphasis as in a headline, and sometimes one is tempted to set the entire advertisement in capitals, hoping to secure still greater emphasis. This practice will stand a little scrutiny. In studying legibility of upper and lower case, it is profitable to consider it from two standpoints: letters and words. It is necessary, of course, to control the size variable, and the most practical way to do this is to compare capital and small letters or words in the same point. The typographers figure 72 points to an inch, meaning that 72 point type would set one line to an inch, 36 point would set two lines to the inch, and so on. With single letters in the same point the maximum distance at which capitals can be perceived is about 18 per cent greater than the maximum distance for small letters. This is probably because, on the average, the capitals are somewhat larger in actual area. Capital C is obviously larger than small c, although capital B does not show as much difference from small b because the latter has a vertical extender. With words, however, the result is quite different. The best approach here is to flash the same words printed in capitals or small letters for a fraction of a second. It is then a matter of determining what proportion of lower case words the subject can read in comparison with upper case words. In one experiment of this sort a difference of 30 per cent was obtained in favor of the lower case, or small, letters. This was in spite of the fact that the total area of the words was somewhat less. The explanation lies in the nature of reading habits. One does not read every letter in the word, but picks out a few landmarks or cues here and there and fills in the rest. This can be demonstrated easily by presenting words in a short-exposure apparatus with some letters left out or incorrect, and the subject reads them without difficulty. Hence legibility depends considerably upon the availability of these cues by which the subject can infer the word without reading every letter in it. Lower case words have more such landmarks because of the ascenders and descenders. Take the word "Psychology," for example. In upper case, every letter is of the same height but in lower case, the two ascenders for h and l and three descenders for g and two y's give the word more of a unique shape and facilitate recognition. Returning to the question of the advisability of using upper case for the entire advertisement, such an arrangement would definitely retard the reader. The emphasis derived from the upper case would be more than offset by the loss in legibility. A few words in the headlines set in upper case would be all right, or an occasional word in the text may be emphasized in this manner with impunity, but for any extensive reading, it is better to use lower case.

Length of line. It is quite possible to set a line too long for effective reading. The eye does not move smoothly along the line, but fixates at one point, takes in a few words, jumps to another point, and fixates again. Obviously each start and stop requires effort and a most effective arrangement is one which minimizes these stops and maximizes the amount of material obtained at each one of them. The optimal arrangement can be determined by photographing eye movements (page 160) and noting the number of fixations per line and their duration. The amount of material obtained in each pause for 10 point type is greatest for a line three or three and a half inches long.[38] If the line is too long, the subject often has difficulty in bringing his eyes back to the beginning of the next line. The photographs of the eye movements often show this fumbling. Furthermore, a person gets some of the content of the next line in the margin of his attention when reading one line and thus is set for the second line when he comes to it. If the lines are too long, the context of the following line is too remote to be of much help. Thus, if an advertiser has a full page in a large format, it is well to set the type in two columns so that the lines are of more nearly optimal length for easy reading.

Space between lines. Instead of setting the type solid, it is frequent practice to put a little lead between the lines. Some investigations indicate that, particularly with small type, this increases legibility. One of the most notable instances involved a metropolitan telephone directory which was becoming unwieldy because of the number of subscribers. It was desirable, if possible, to put more names on a page. The problem was approached experimentally by setting a few pages of a directory in a particular typography and then having subjects look up the telephone numbers of specified subscribers. The speed with which they did this was the index of legibility used. The final arrangement which was adopted as a result of this experiment employed somewhat smaller type, but one point of lead, that is, 1/72 of an inch more space, between the lines. Under these conditions, it was possible to print 25 per cent more names on the page, but the actual legibility was *increased* 13 per cent. The additional space between the lines avoided some confusion where the descenders from one line interferred with the ascenders from the next.[39]

---

[38] Tinker, M. A., "Photographic Measurement of Reading Ability," *Journal of Educational Psychology,* 1929, 20, 184–191. For an extensive summary of experimental work on typography see Paterson, D. G. and Tinker, M. A., *How to Make Type Readable.* New York: Harper's, 1940.

Unusual arrangement. Layouts sometimes are made with very unusual type arrangements in the interest of novelty. This should be done with considerable caution because usually such arrangements make for illegibility. Advertisements have been printed with the words reading up-hill or down-hill or concentrically around a semi-circle so that the reader actually had to move his head or move the page in order to read the entire advertisement. The winner in a "worst advertisement" contest had type running diagonally through a picture of an electric lamp with the filament mixed up with the type. Setting the different lines in the advertisement in different lengths is also confusing because it breaks up the ordinary reading habit. Unless there is some very good reason for it, one should be hesitant about adopting unusual type arrangements.

Appropriateness. There are some possibilities of using typography to carry atmosphere or meaning quite apart from its actual legibility. Some studies have been made in which the subjects were asked to match different type specimens with different qualities. A few trends are worth mentioning. Cheapness is often suggested by bold Gothic type—a heavy, black letter with no embellishment. This type face is often used in advertising sales and cheap bargains—hence the association with cheapness. Old English type with its ornate appearance seems to suggest dignity. It has been used on imposing documents where dignity would be in order and thus becomes associated with that atmosphere. Some light, delicate styles such as script seem appropriate for jewelry, and perfume, and delicate products. However, the atmosphere created by typography is limited to a few aspects and is not very pronounced.

[39] Baird, J. W., "The Legibility of a Telephone Directory," *Journal of Applied Psychology*, 1915, 1, 30–37.

Summary

Certain characteristics of stimuli attract involuntary attention and may be used to give a particular advertisement an advantage over its competitors. Although large stimuli secure more attention than small, the attention does not keep pace with size but lags behind—in fact, the attention is roughly proportional to the square root of the area. Large advertisements have proved successful but this apparently is because a better advertisement can be constructed in the larger space. It is the relative and not the absolute size that is important, and a full page in one format is just as effective as in another. Attention to one item detracts from other items so that a small advertisement on a page dominated by a large one would be at a greater disadvantage than if it were competing only with others of its own size. Small advertisements repeated in the same issue may be as effective, or more effective, than a single large advertisement, especially if they are varied somewhat. If, however, the small advertisements are to be repeated some weeks apart in successive issues, it is preferable to use the large space rather than rely on repetition. Large type secures more attention than small but headlines larger than 48 point cannot include enough letters to convey a message.

Intense visual or auditory stimuli are effective in catching attention. If, however, an item is to stand out from its background, it must be more intense than that background by a certain per cent. This principle has a bearing on the location of a brightly lighted window display or of a speech amplifier.

Motion is a strong incentive to attention and operates even in the periphery of the visual field. If the advertisement is in a location at one side of the usual field of vision, it is advisable to introduce motion into the display. Moving pictures would be a very effective medium for advertising except for the fact that the audience protests because they paid admission and have no control over the advertising as they do when they are reading a magazine or listening to the radio. Motion may also be suggested in a stationary picture. Contrast in size, color, or brightness may be used for attention purposes. In connection with the last of these there is a possibility of reversing typography and having white letters on a black ground. This arrangement embodies the same degree of contrast but legibility is decreased because of conflict with reading habits. Other aspects of contrast are temporal as in a flashing sign or contrast in meaning as in the before-and-after-using copy.

Isolation gives an object considerable claim upon attention. There often is a tendency to crowd too much into an advertisement for the limited range of attention. Isolation has been studied experimentally by adding white space to an advertisement in different amounts and noting the attention value. Up to about 60 per cent additional white space the process more than pays for itself, but beyond that point there are diminishing returns.

Experiments indicate that the upper left portion of a flat page is more insistent from the attention standpoint. Reading habits and the tendency to notice the upper parts of things generally account for this. If the magazine is bound so that the pages do not break wide open, it is the upper outside edges that are most favorable. Right pages are superior to left from this standpoint, possibly because of habits of manipulating the magazine with the right page broadside. Some pages within a given medium have better value than others. Here the effects of primacy and recency are obvious. Although higher rates are charged for the beginning and end pages, some other pages a little farther into the medium nevertheless derive some benefit from primacy and recency. It is alleged that a flat make-up insures that the reader will see more advertising because he turns to certain pages to finish the stories. This claim needs some scrutiny because, even though he turns to a particular page, there may be a conflict of attitude between the advertisement and the adjacent editorial material. Experiments with dummy magazines tend to discount this alleged advantage of the flat arrangement. There are possibilities, however, of a flat make-up where the advertisement is adjacent to other material which is related in content. The advertisement in a large medium with much other advertising is at a disadvantage. Unfortunately the smaller media which have less competing advertising also have small circulation.

Novelty devices used for attention purposes include mechanical arrangements, actual stunts, clever phraseology, occasional exaggeration or absurdity, and unusual typography. A device deserving special mention is human decoys to get persons to look at a window display or a poster. Novelty must be used with caution because it soon wears off, and it is necessary to keep changing the device if the novelty aspect is to be maintained.

Humor is used sparingly as a means of attracting attention to advertising. Although some campaigns have been very successful, humor frequently misfires. There is a danger that it will suggest that the advertiser is side-stepping the more serious selling points. Humor, moreover, wears out rapidly if the prospect sees the same advertisement repeatedly. In this connection the objective type of humor stands up better than does the subjective, in which the joke is on the reader.

Color has demonstrated its effectiveness by increasing returns or sales in many instances. The further question arises as to the comparative effectiveness of the different hues. Experiments indicate a slight trend in favor of the red end of the spectrum so that if there are no ulterior considerations, that portion may be used more effectively to catch attention. There is no color which everybody likes. People have been conditioned individually to like different colors. The individual is quite stable in his preference but differs from other individuals. There are a few instances in which color quite generally carries a certain atmosphere. The red end of the spectrum suggests warmth, and the blue end, coolness.

Pictures often are very effective in catching attention and they make it possible to give a message in brief compass. Pictures of people are better than pictures of objects from the attention standpoint. There also is some indication that the photograph is superior to the drawing, possibly because it appears more realistic. It is important, however, that the picture be relevant to the product because of the danger that the prospect will look at the picture and not get the rest of the message. If an irrelevant picture is used, it should be tied in immediately with a selling point. There are indications that attention devices which appeal to interest instead of being merely mechanical in nature are better from the long-time standpoint.

It is necessary to keep the prospect's attention once it has been secured. This may be facilitated by giving the advertisement a certain degree of unity so that it all holds together. Borders or pointers contribute to this end. If the advertisement is pleasant from an aesthetic standpoint, the reader is more inclined to prolong his scrutiny of it. Even simple lines carry certain feelings which may be pertinent—the respose of the horizontal line and the activity of the diagonal. There is a suggestion of activity in a triangle as contrasted with solidity in a square. A rectangle is most acceptable to the average observer if the sides are in the proportion of approximately three to five. This has a bearing on proportions of a panel in an advertisement. Some other art principles such as balance are pertinent. It has been demonstrated that laymen without any art training are responsive to good art work.

In addition to the feelings aroused directly by the advertisement, it is a good idea to consider those called up by a process of association and imagery. Actual words convey imagery by their mere phonetic aspect or by their imitation of natural sounds. Consonants like *l* and *r* are more pleasing than gutterals like *g* and *k*. A word that is difficult to pronounce may be unpleasant so that the prospect will ask for another brand. The meaning of a trade name may carry subtle possibilities of imagery. Again, the text of the advertisement may be so phrased as to call up mental pictures. Similarly, the pictures in the advertisement may arouse other associations and images. This is especially critical with reference to food advertising where the effort to portray some selling point may arouse unfortunate ulterior associations.

Legible typography is conducive to prolonged attention to the advertisement. With reference to type face it develops that letters with fairly heavy strokes and uniformly heavy strokes are more legible. Capitals are seen more readily, but words printed in small letters can be read more quickly, because of the more characteristic shape of the words set in small type. A line which is too long slows down the reader, so that he does not get as many words every time the eye starts and stops and he often gets lost in finding the beginning of the next line. A little space between the lines often increases legibility by avoiding the confusion between the ascenders and descenders. Unusual typographical arrangements which are sometimes adopted in the interest of novelty will often produce illegibility. There are possibilities of a type face lending atmosphere to the advertisement—for example, the cheapness suggested by a heavy block type and the dignity going with Old English.

24

INFLUENCING THE PROSPECT'S MEMORY

Even though a prospect has observed an advertisement and has become interested in the product, it is necessary to make him remember the brand name until he is in a position to buy. He seldom dashes down to the drugstore to buy toothpaste immediately after reading about it in a magazine or hearing the announcement on the radio. Later, when the need becomes more insistent, it is a question of whether he will remember the particular brand which he saw or heard advertised. Consequently, some principles of memory are pertinent to the advertising situation.

Principles of Association

Memory, from the standpoint of marketing, involves essentially the formation of associations between some need and a product identified by a brand name which will satisfy that need. It is not enough for the prospect to recall having seen an advertisement for soap, but he must remember the name so that when he goes to the store he can secure that particular brand. Certain fundamental principles of association which have been encountered elsewhere are thus pertinent in the present connection.

Frequency. One of these basic principles is frequency. The child is given the two items 3 × 4 and 12 many times, and the more they are repeated the stronger becomes the association between them, so that in later life when he encounters 3 × 4, it immediately calls up 12. By the same token, if he has repeatedly associated a need such as clean teeth with a particular brand of toothpaste, when he thinks of brushing his teeth, he will think of that brand. The discussion of size and repetition in advertising brought out the point that under some conditions a small unit repeated was as good as, or even better than, a large unit presented only once. Experimental evidence on the effect of repetition is easy to obtain. A dummy magazine was made up with some advertisements presented once, some twice, and some four times. The subjects looked through it in the usual fashion. The corresponding recall values were in the ratio of 1.00, 1.24, and 1.61.[1] Recall evidently lags behind frequency as two presentations are not twice as good as one. This is similar to the lag of attention behind size previously noted, but in this instance the lag seems greater. In fact, the ratios just cited are almost in proportion to the cube root of the number of presentations, as the cube root of 2 is 1.26 and the cube root of 4 is 1.59.

Recency. In everyday life things of yesterday are remembered more readily than those of last month. The process of forgetting begins immediately after an experience and proceeds rapidly at first (page 140). This all points to the effectiveness of recency in advertising. If one reads the advertisement in the morning paper on the way downtown on a shopping trip, the trade name presented has an advantage over competing brands read the night before. A picture of a package on a car card facilitates recognition in the store a few minutes later. A possible advantage of newspaper over magazine advertising is that the interval between reading the advertisement and purchasing the product usually is shorter. A rough indication of the magnitude of the recency effect may be seen in an experiment on associating colors and numerals when they are presented in a series of pairs. Those in the middle of the list were recalled about 36 per cent of the time, and those in the last position were recalled 54 per cent.

Primacy. Coordinate with recency is the effect of primacy. The first of a series of stimuli often leaves a strong impression. Many adults still remember some initial impression of childhood, such as the first day at school, or the first visit to a church. Experiments were cited (page 703) on the value of early and late pages in the magazine as compared with those in the middle. The advertiser has less control over primacy than recency, except in the cast just mentioned. Although it is possible for a brand to be the one just seen by the prospect in an advertisement before entering the store, it is more difficult for the brand to be the first he ever experienced. There are some possibilities, however, in reaching children so that their first experience with advertising for a product deals with a certain brand. If the advertiser is able to catch the child when he is first becoming conscious of what is said on the radio or first beginning to read simple advertisements, it may be possible at that moment to associate breakfast food with a particular brand or automobiles with a particular make so that when the child is old enough to be in the market, that earlier association will persist because of its primacy.

---

[1] Strong, E. K., "The Effect of Size of Advertisements and Frequency of Their Presentation," *Psychological Review*, 1914, 21, 136–152.

Vividness. If an experience is vivid or intense, it is apt to be recalled more readily. In association tests where a person gives the first word connected with a stimulus word, very frequently the responses will be found to involve some vivid events if they are analyzed. If a person attempts to recall early childhood experiences, he is apt to come up with a vivid experience such as a severe punishment or an accident. The school teacher uses devices for enhancing the value of her stimuli by raising her voice, or employing diagrams, colored chalk, or gestures. The various attention devices discussed earlier may contribute to making the experience more vivid in advertising. Large colored displays, intense lights and sounds, moving electric signs, dramatic headlines—all serve to strengthen associations as well as catch attention.

Emotional factors. It is well established that the emotional aspects of an experience have an effect upon its retention. The so-called hedonic theory of memory mentioned in the discussion of testimony (page 302), was demonstrated in an experiment in which the subjects recalled about 21 per cent of pleasant, 18 per cent of unpleasant, and 14 per cent of neutral words. Numerous experiments have been conducted upon this point, which still seems to involve some controversial aspects.[2] It is not clear whether the pleasantness and unpleasantness facilitate memory directly or whether such items are rehearsed more frequently in the interim. Some people do brood over their troubles, and many think over their pleasanter experiences in retrospect. From the advertiser's standpoint it makes little difference as long as items with an affective tone are recalled readily. Something may be said, too, for the pleasant rather than the unpleasant association because, in addition to promoting recall, it creates a favorable attitude which should make for acceptance of the product. Only in the case of certain products where the negative appeal (page 666) is especially pertinent would the unpleasant be perferable to the pleasant approach.

Comparative effectiveness. It is difficult to state just which of these principles of association would be most effective in a given instance. Experiments have been conducted with words or other stimuli presented in different positions in a sequence and with different degrees of vividness as emphasized by color or size. However, it is difficult to evaluate the results because, for example, it is impossible to tell just how much vividness is represented by a word printed in red as opposed to one in bold-faced type. In one study of this sort vividness and frequency as produced by three presentations had the most pronounced effect on memory, but were followed closely by recency, whereas two presentations were appreciably inferior.

---

[2] For a fairly extensive summary see Blankenship, G. M., "The New Status of Experimental Studies on Relationship of Feeling to Memory," *Psychological Bulletin*, 1938, 25, 26–35.

Direction of Association

Facility in association, at least as indicated by its speed, depends somewhat on the direction in which the association operates. The association-reaction technique in which a stimulus word is given and the subject responds with the first associated word was described (page 325). An interesting variable in this connection pertains to whether the stimulus word is a product or a brand name—whether the association is from general to particular such as soap—Ivory, or from particular to general such as Palmolive—soap. The experimental results are quite clear. In one such investigation the association from particular to general—that is, from the brand to the product—required 1.24 seconds on the average, whereas the average time for association from general to particular was 1.39, a difference of 12 per cent. Other similar experiments showed a difference of 24 and 58 per cent. It is clear that a prospect can think more quickly from brand to product than *vice versa.*

Forward *versus* backward association. This greater facility of association from particular to general is not favorable for the advertiser. In the usual marketing situation a need arises, and the prospect thinks of some particular product to meet that need, and then it is a question of what brand occurs to him through a process of association. The visitor to a strange city does not think to himself, "I guess I'll go to the Statler; I suppose that is a hotel," but rather he thinks "What hotel?" and then it is a question of what particular name he recalls. This, obviously, is association from general to particular which is not the most effective direction. However, there is another principle which may be used to offset this difficulty. Forward association is more effective than backward, that is, if materials are presented in the order *a, b, c, d,* it is easier to get them back in the order *a, b, c, d,* than in the reverse order. This principle may be demonstrated by attempting to say the alphabet or a poem backwards. Thus, if two items are presented in succession in an advertisement, the association becomes stronger in that particular direction so that the first will readily call up the second, although the second will not so readily call up the first. Hence the advertisement should mention first the need or the product and then the brand name.

"Hotel Statler" would be preferable to "Statler Hotel." If the former arrangement is presented frequently enough, a strong forward association is built up from Hotel to Statler so that when the prospect comes to town and begins to wonder about a hotel he will readily think of Statler.

Association Tests of Advertising

Association methods are sometimes used to check on what associations are current with reference to a particular product. Names of a series of products are presented for each of which the subject gives the first brand which occurs to him. The reaction time is not of interest in this particular case. Data may be gathered from groups of subjects simultaneously so that an adequate sample is easy to obtain. Frequently it develops that some product has a dominant brand. For example, sewing machines brought the response "Singer" in 77 per cent of the cases, and soup elicited "Campbell" 76 per cent of the time, whereas products like ribbons, umbrellas, and rice had no trade name that was especially outstanding. Such results reflect something of what advertising has done to the associations of the public. The manufacturer of an infrequently mentioned brand might well do something about it. Disquieting results sometimes are obtained when, in addition to the association test, the subjects are asked what brand of the particular product they use. Frequently the brand first mentioned is not the one which is actually used.[3] In one study the brand mentioned and the one used coincided in only 58 per cent of the cases. However, there are some extenuating factors in this situation. It may be that the advertising has involved publicity for the name with insufficient inducements to purchase, so that people know about it but have not bought it. In other cases the brand actually used might be a cheap one which the prospect could afford, although he is most familiar with the expensive but unattainable one. Again, sheer habit can account for the continued use of a brand, although the impact of advertising has led to greater familiarity with another name. Many a customer enters a store with a mild resolution to purchase a brand he has seen advertised, but habit operates and he buys the same old one. Then there occasionally are purchases which last a long while. A person still may be using a fountain pen he bought ten years ago before the new make was advertised.

Another type of association test asks questions like the following: "What coffee advertises the date on the can?" or "What toothpaste advertises about pink toothbrush?" This method has been used quite extensively in door-to-door interviews and gives some check on the effectiveness of the selling points, at least from the memory standpoint. Along this same line are investigations of the extent to which slogans actually are associated with the product. Some subjects associated "It hasn't scratched yet" with underwear, rather than cleanser and "$99^{44}/_{100}$ per cent pure" was associated with whiskey instead of soap. In such cases the slogans would not help sell the cleanser or the soap. It is important that any mnemonic device like a slogan be strongly associated with the thing which it is attempting to sell.

---

[3] Poffenberger, A. T., "Psychological Tests in Advertising," *Journal of Experimental Psychology,* 1924, 7, 312–320.

Memory Devices

Ingenuity. There are some special devices that the advertiser can use to facilitate memory for the brand or the product. One of these may be classified as mere ingenuity. There is no general principle involved; it is merely a question of some arrangement devised for an occasion. One instance would be the trade name which constitutes a play on words and perhaps embodies a selling point, such as "Uneeda," "Iwanta," "Slipnot," or "Sealedsweet." Telephone numbers lend themselves to ingenious, mnemonic schemes such as the "1313" or "1234" for local taxis. Before-and-after pictures might be classed as this type of device.

Rhyme and alliteration. It is easier to remember poetry than prose, other things being equal. Recall of one line helps bring back the next line which rhymes with it. Alliteration operates in much the same fashion —"The Ham What Am" or "A Kalamazoo Direct to You," or "An Apple a Day Keeps the Doctor Away," or "Oshkosh, by Gosh" overalls. Similarity of the sounds produces a stronger association between them. More ambitious copy writers sometimes attempt a little poem about the product. If this has any appreciable length it will not be memorized by the reader. A short, snappy slogan generally is better.

Rhythm facilitates memory and is an additional reason for the advantage of poetry over prose. It is easy enough to demonstrate this facilitating effect of rhythm by reading to the subject lists of numbers, sometimes rhythmically and sometimes otherwise. Even when the subject merely looks at numbers with a view to reproducing them, he is inclined to group them. There is a further question as to whether some types of rhythm are better than others. This was investigated by reading numbers aloud in different rhythms, iambic (two syllables in each foot with the second accented) or dactylic (three syllables per foot with the first one accented), and so on, and having the subjects reproduce them. The results are summarized in Table 44, which gives the average memory scores made by subjects of each sex for the rhythms indicated at the left.

TABLE 44

Memory for Numbers in Rhythm *

	Men	*Women*
Non-rhythmic	92	92
Trochaic —˘/—˘/	91	90
Iambic ˘—/˘—/	97	94
Dactylic —˘˘/—˘˘/	110	109
Anapestic ˘˘—/˘˘—/	108	112

* Adams

The trochaic shows no superiority to the non-rhythmical, the iambic a slight superiority, but the interesting point is that the three-part rhythms, dactylic and anapestic, are appreciably superior.[4] Hence, if rhythm is to be used as an aid to memory in a slogan or an advertisement, it is a good idea to take account of this superiority of the three-part rhythms.

Arousing activity. An effective procedure for leaving an impression on the reader of the advertisement is to induce some motor performance. A person remembers a name more readily if he speaks it instead of merely listening to it passively. The salesman utilizes this principle by attempting to get the prospect to do some such thing as take the egg-beater in her hand and turn it or get into the car and drive it. Readers of advertisements often are urged to make some kind of a test of the product—to look at a sheet of paper against the light, or crumple it in the hand and listen to the sound, or drop an aspirin tablet in water and time it as it dissolves. Cutting-out is a common device—the picture of a wrist watch is to be cut out and held around the wrist to see how it looks. Coupons also call for cutting. Quite apart from the fact that the coupon brings an inquiry which can be followed up, it also reinforces the prospect's memory. Some coupons introduce an interesting variation in the form of a figure sticking out over the edge. With a picture of a Scotchman protruding in this way only 63 per cent of the readers who returned the coupon cut straight through the Scotchman. Some of them cut out around him roughly but some actually outlined him carefully. A person in the latter group would probably remember more about the advertisement than one who just slashed through the picture. Similarly, an oil concern had a dumb looking character projecting, but only 40 per cent of the coupon clippers decapitated him.[5] Then there are the advertisements in which the reader is urged to do some ulterior thing. Quite successful copy for a dancing school involved diagrams of some steps presented in the form of footprints with the left foot white, the right foot black, the successive positions of the feet numbered, and dotted lines connecting them to show the direction of the motion. Many readers went through the steps and, incidentally, were reminded of the dancing school.

---

[4] Adams, H. F., *Advertising and Its Mental Laws,* page 241. New York: Macmillan, 1923.

[5] Anonymous, *Printers' Ink,* July 6, 1945, page 114

Contests represent another instance of getting the prospect to do something. Often large numbers of persons participate, presumably in the hope of receiving "something for nothing," or because of the fun of solving the puzzle. The number of contestants may reflect the employment situation. During the depression in the early 1930's contestants who had nothing else to do stormed the libraries and wore out the dictionaries, trying to make up all possible words out of certain letters which constituted some trade name. They even worked in teams so as to utilize the dictionary continuously. One point that is important in contests is the desirability of a considerable number of prizes. A single prize of several thousand dollars is beyond the hope of the average individual and he assumes that some more competent person will receive it. He may be correct in this assumption because there are persons who make a business of winning contests by systematic effort, and there are even enough professional contestants to warrant publication of magazines especially for their benefit. However, with numerous prizes, the average reader assumes that he has some chance and is more inclined to participate. Circumscribing contests with procedures for proof of purchase is somewhat questionable. According to law one cannot require a purchase for participation but "Reasonable facsimile" makes the average reader feel that including an actual box-top would be more favorable and a facsimile might prejudice the judge. Of course, this procedure does help defray the cost of the contest. In one big cigarette contest, tons of wrappers were carried away from the agency at the termination of the contest. Psychologically, however, there may be some little unpleasantness aroused by the necessity of purchasing a product in order to participate in the contest, and some of that unpleasantness may actually transfer to the product itself, so that the participant is not too favorably disposed toward the concern. Then, on top of that, if he wins nothing, his attitude gets another jolt, and he may not become a customer even though he has been reminded vividly of the product. The contest without stipulations runs less chance of arousing ill will.

Reminders. A device which occasionally is useful in direct mail advertising or as a follow-up to a personal call is some type of reminder which a prospect will see occasionally and thus think of the product.

Sales letters are likely to find their way into the waste basket. If, however, something comes through that cannot be filed readily and is not worthless enough to throw away immediately, something else happens. A furniture concern sent a small can of varnish to the prospect with a covering letter indicating that this was the kind which was used on the furniture. The varnish had a tangible value, and the recipient did not throw it away immediately, neither could he file it, so he left it on the desk for a day or two while he was deciding what to do with it. That was all the manufacturer wanted, for in that day or two, the varnish reminded the prospect of the furniture. Another manufacturer sent a book with certain passages marked and a memo that "the author was thinking of our product when he wrote this." This may not have been the case, but at any rate the book was around for a few days as a reminder of the product. The manufacturers of cellophane sent a series of mailings to top people in concerns who might consider using cellophane for a wrapping. There was a baby's wash cloth, followed by a number of cigars wrapped in cellophane, then a nail clipper, a package of dates, marshmallows, a shaving lotion, and a cake of soap, each item accompanied by a letter calling attention to the way that the wrapper preserved some quality of the product, with the final suggestion that the prospect might be interested in using cellophane to wrap his product. These tangible items would be kept for a time or even carried home and would provide some further reminder of cellophane. Another concern sent the prospect a small hand stereoscope and a few pictures showing uses of the product. The situation was sufficiently novel so that the recipient looked at a few of the views. Another type of reminder is that inserted part way through a package suggesting that the person get another package before this one is completely exhausted.

Narrative. People remember narratives better than essays, and the same principle operates in advertising. The picture shows men in a Pullman washroom talking about shaving soap or safety razors. A manufacturer of piping and automatic sprinklers dramatizes events out of the day's work, featuring an argument between the engineers and some youngster who has some new ideas which work out better than those of the old-timers. Or there is the story about how Aunt Jemima left the farm and came up to St. Louis to show them how to make pancakes and, as a result, developed this pancake flour.

Forgetting and follow-up. Another general consideration of memory for advertising is the actual course of forgetting. Figure 6 (page 141) indicated the trend of forgetting for a number of school subjects with the typically rapid initial drop. Similar results are found when advertising material is used, and it is seldom that advertisements are overlearned to the extent that the curve would not show a rapid drop. In the discussion of size and repetition (page 693) it was noted that small advertisements repeated in the same issue might be good, but if they were in successive issues, they were less effective because of the trend of forgetting.

One remedy that is especially applicable in direct mail advertising is to follow up the original circular with additional presentations before the initial effect has entirely worn off. This raises a question as to the most effective schedule for follow-up. Recurring again to the school situation, Figure 7 (page 141) showed the superiority of earlier to later follow-up. The same trend has been found with reference to advertising. One experiment may be summarized briefly. The material comprised pairs of names—a product followed by a fictitious trade name such as "perfume—Petal" or "china—Mangone." The subject's task was to recall or recognize the brand name when he was given the name of the product. The original list was presented twice at a constant rate, sometimes orally and sometimes visually on a screen. The list was then broken down into several sublists for investigation of recall and recognition. One of these sublists was tested immediately to get an initial point on the curve of forgetting. Three days later a test was made on another sublist of the words. At this time, also, a portion of the initial list was presented again, and part of that was tested immediately. After ten days there were further tests on portions of the initial list that had not been repeated in the interim, portions of the list that had received a second presentation after three days, and portions that had the second presentation at the ten-day stage. Finally, after sixteen days, still further words of the three kinds were tested: those which had been presented on the original day but not checked upon since, those which had been repeated on the third day with no subsequent consideration, and those which had been repeated on the tenth day but not checked until the sixteenth. The results are summarized in Table 45.[6] The entries indicate the percentage of the actual words given which were recalled or recognized by the average subject. Figures across the first row are for the material which was given once, that is, with only an initial presentation. At the outset 52 per cent was recalled, whereas after three days retention dropped to 11 per cent. Figures in this row indicate the typical curve of forgetting with the rapid initial drop. The results with recognition are similar. In the next row are the results for early follow-up, and the drop in subsequent

---

[6] Burtt, H. E. and Dobell, E. M., "The Curve of Forgetting for Advertising Material," *Journal of Applied Psychology*, 1925, 9, 5–21.

TABLE 45

Early and Late Follow-Up

	Recall				*Recognition*			
	0 *Days*	3 *Days*	10 *Days*	16 *Days*	0 *Days*	3 *Days*	10 *Days*	16 *Days*
Initial	52	11	6	5	93	75	64	64
Initial and Third		57	22	16		99	90	80
Initial and Tenth			48	15			92	81

days is not as great. In the bottom row the results for late follow-up show a greater drop than for the early follow-up. For instance, with the early one about a week after the follow-up there is still 22 per cent recall, whereas a week after the late follow-up there is about 15 per cent recall. This is quite in accord with the results presented earlier in connection with school situations. Thus, if the mail order advertiser is interested in forestalling the maximum forgetting after his first presentation, he would do well to follow it up reasonably early. Otherwise, the effect of the first advertisement is completely effaced, and he has to begin all over again.

Trade Marks and Trade Names

A memory device which deserves special mention is the trade mark or the trade name. A large number of these are in existence and some of them have a long and honorable history. Baker's cocoa began in 1780, Pears' soap was christened in 1800, and Colgate's trade name dates from 1806. It will not be profitable in the present discussion to distinguish sharply between trade marks and trade names. Both of them serve the same purpose psychologically, although there are some legal differences.

Values. One obvious advantage of a trade name is its convenience in affording a simple means of identifying the product. Without this device it might be necessary to go into the store and ask for a bar of soap that was pale green, slightly convex on the larger surfaces, and with a certain indescribable odor. It is much simpler merely to give the name. The use of the trade name actually speeds up the selling process. This was discovered by the simple expedient of unobtrusively watching people while they were making purchases. It took 23 seconds to buy a bottle of canned goods when the name was not used, and 9 seconds when the customer bought by the brand name. Another value of the trade name is the good will which may be built up in connection with it. If the name represents an old, reliable company that one has known since childhood, anything marketed under that name derives a certain vicarious good will. That is why certain family names are so valuable. A case in point is Rubber-Set toothbrushes. Considerable good will had been built up in connection with the name by the quality of Rubber-Set shaving brushes. A modest campaign for the toothbrushes was started but had to be canceled almost immediately so the plant could catch up on production. The family name brought so much good will to the toothbrushes that they sold far beyond expectations. The good will accruing to a trade name may be noted further by studying the comparative preference for different brands when the subject does and does not know the actual brand name. Blindfold tests bring this out clearly. A group of women were interrogated about perfume, and 60 per cent expressed a preference for certain foreign brands. They were then tested with three domestic and three foreign perfumes in bottles labeled in code. Sixty per cent chose the domestic perfume when judging purely by its odor. Obviously the foreign label had a considerable influence on preference. Similar blindfold tests of cigarettes under laboratory conditions have shown that people cannot identify brands nearly as well as might be suspected from popular conversation. Camels, for instance, were correctly identified as Camels in 31 per cent of the attempts, but were considered to be Luckies in 14 per cent and to be Chesterfields in 38 per cent. An exception was a mentholated brand with its characteristic odor.[7]

Another value of the trade name or mark is its protection of the manufacturer and the consumer. If the former has built up a favorable attitude toward his product by investing heavily in advertising, and some competitor comes along with a brand name which is confusingly similar to his, some of the public who want to purchase the original will get the imitation by mistake. If this confusion is very pronounced, there will be legal action to prevent the second party from using the infringing name or mark. The question of actual similarity between the names and the resultant confusion is, to quite an extent, a psychological problem. Some litigated cases have used expert testimony of psychologists who conducted investigations to determine the actual similarity. The technique involves presenting a series of trade names, or trade marks, or labels, as the case may be, under standard conditions with reference to length of exposure and including in this list the name of the plaintiff—for example, Coca Cola. The subjects are instructed to read these names as they are presented and attempt to remember them. This series is followed by a second one presented more slowly, and the subjects are required, for each word in this list, to indicate whether or not it was in the first list. The second list includes some of the names in the original list but not Coca Cola, some entirely new names, and also the name of the alleged infringement—for example, Cheero Cola. The important question is what proportion of the subjects, when confronted with the second list and coming to the word Cheero-Cola, say it was in the first list, in other words, what proportion erroneously recognize it. This percentage in itself, however, does not mean very much because the conditions of the experiment might be such that it would be very difficult or very easy to get confused on that particular item. If there were a large number of words in the original list so that there would be considerable inhibition between them, or if they were presented with extreme brevity, then it would be possible to produce 80 or 90 per cent confusion on the critical word. Similarly, the task could be made so easy that very few mistakes would occur. An adequate basis for comparison can be secured by noting the amount of confusion in other parts of the list where everything is straightforward. In a typical experiment of this sort about 10 per cent of the time mistakes were made in failing to recognize a duplicate or erroneously recognizing a new name. This 10 per cent gives a notion as to the general difficulty of the experimental conditions, and might be termed "normal confusion." In this same study there was about 30 per cent confusion on the critical words, that is, about three times as much as when there was nothing equivocal. The court would have to decide just how serious was this ratio of 3 to 1. It is of some interest to include in such an experiment a few cases which actually have been litigated and on which decision has been rendered. For example, the original list might include Sea Foam Baking Flour and the second list Soda Foam Baking Flour, an actual case which had been judged by the court to be an infringement. Results of a few pairs of names of this type are given in Table 46. The upper portion of the table gives some pairs of names which were judged as infringements by the court, and the lower portion some which were considered noninfringements. The figures at the extreme right indicate the per cent of confusion obtained by the method just described. Inasmuch as the data were all secured in the same experiment these per cents are all comparable as the same normal confusion was involved. Rather disquieting is a finding that,

---

[7] Husband, R. W. and Godfrey, J., "An Experimental Study of Cigarette Identification," *Journal of Applied Psychology*, 1934, 18, 220–223.

TABLE 46

Average Per Cent Confusion of Individual Names

Original	Imitation	Per Cent
INFRINGEMENTS		
Backus Oil Company	Backus Oil and Car Grease Co.	38
Boston Peanut Roasting Co.	Boston Trade Peanut Roasting Co.	64
White Star Steam Laundry	Star Laundry	20
Manufacturers' Outlet Co.	Taunton Outlet Co.	17
U.S. Dental Association	U.S. Dental Rooms	21
Safe Cabinet	Globe Cabinet Safe	15
Yusea Incandescent Lights	U.C.A. Incandescent Lights	26
Sea Foam Baking Flour	Soda Foam Baking Flour	33
Average		29
NONINFRINGEMENTS		
Young and Chaffe Furniture Co.	Chaffe Brothers Furniture Co.	39
Silver Laundry and Towel Co.	Silver Cleaners, Dyers and Dryers	26
S.B. Cough Drops	B. and S. Cough Drops	27
Sozodont Tooth Paste	Kalodont Tooth Paste	23
Magic Cleanser	Magico Cleanser	44
Besteyette Raincoat	Veribest Raincoat	24
Average		31

psychologically, there is just as much or even more confusion, on the average, for the names which the courts had judged noninfringements as for those which had been judged infringements. To be sure, other things enter into a decision along with the mere psychological similarity, but one would expect that the results on the whole should come out more in accordance with the actual confusion in recognition. All this indicates the desirability of having a trade name or mark that is as unique as possible in order to minimize confusion with competing brands.

Essentials of a trade name. In general, a short name is preferable to a long one. The long name does not fit in readily with a single act of attention, whereas a short, vigorous name may impress the prospect at a glance. One might hesitate to ask for Barrington-Hall Bakerized Steel Cut Coffee when he could much more easily secure White House Coffee. A somewhat related point is the ease of pronunciation. The prospect may hesitate to use a name which is difficult to pronounce because of the disagreeableness of the attempt and possible embarrassment if his effort is incorrect. In such a case he may use a simpler alternative name. Some cosmetics were marketed under the "Bourgeois" trade mark, but were also featured on a radio program entitled "Evening in Paris." People came into the store and asked for "Evening in Paris" perfume rather than Bourgeois. Some of this may have been due to the more pleasant associations in the former connection, but the ease in pronunciation doubtless was involved. It is an unfortunate reflection on a trade name when the advertiser has to append the pronunciation in brackets, such as Bengué (Ben-Gay). There is the converse difficulty on the radio when the announcer has to spell out the name. A simple experiment asked people to pronounce various trade names and recorded the results in phonetic symbols. Many names were pronounced in at least five different ways. Many of these persons, doubtless, wondered about the pronunciation before speaking. It is unfortunate if a product is christened without some consideration of this aspect.

The name also should be appropriate to the product if possible—sometimes the name is descriptive, like Eversharp. At least inappropriate names should be avoided—a breakfast food was named "It," and an expensive hat was marketed as "Smile." There are trite names of food products like "Flaketa" or "Etabita," which probably took their cue from the early success of "Uneeda." "Whistle" or "Nehi" as names for beverages or "Fat Emma" for a chocolate bar seem mal-apropos.

In the light of the previous discussion of infringements, the name should, if possible, be somewhat unique and difficult to imitate. It may be possible to relate the name to the package like "Log Cabin," or to symbolize the name in a picture like "Thirsty Fiber." This may discourage some imitators. Occasionally, one inadvertently commits a "boner" in selecting a name. A product failed to sell in China because of a dog in the trade mark—dogs over there represent an evil spirit. A toilet preparation failed to catch the theatrical market because the peacock which was on the label suggested bad luck to theater people.

The trade name should not go out of date too rapidly. A name or even a mark might have seemed a natural at the time it was started. For example, the first electrical motor driven washing machine was named "Automatic" to distinguish it from those which had to be cranked by hand. Before many years all washers were automatic, and the name was meaningless. The picture in a trade mark may go out of date pretty rapidly—witness the Smith Brothers' whiskers. The victrola trade mark still uses the fox terrier in an era when other kinds of dogs are much more popular. The trade character is somewhat more flexible. Aunt Jemima or the fellow that sells Cream of Wheat are more timeless, and, by a little change of costume, can retain adequate continuity. Another possibility is to go so far back in history that the character cannot get much more out-of-date anyway. A few hundred years would make little difference in the antiquity of a picture from classical mythology.[8]

---

[8] For possible types of trade names from which selection might be made, such as manufacturer, description of product, effect on user, see Erbes, P. H., "Finding a Name for that New Product," *Printers' Ink*, October 1, 1943, pages 28 ff.

Shape. One minor problem arises in connection with the geometrical shape of a trade mark. An investigation employed various shapes of about the same area, cut out of black paper pasted on white cards. These were presented in standard fashion, and a recognition test was conducted. The result indicated that shapes which could be named, like crescent, cross, crown, and circle, were remembered more readily than shapes which were nondescript.

Associating with the product. Trade names and marks should be definitely associated with the product. Just as an irrelevant picture may draw attention to itself and be remembered without the reader remembering the product at all, so a trade name or mark may sometimes be remembered in isolation without tying in with the product. Rubber-Set, for example, was identified by some prospects with typewriters, rubber heels, or automobiles. "1847," the trademark for silverware, was associated with various alcoholic beverages, and "2 In 1" was confused with "3 In 1." This association of the name with the product is partly a function of the way they are presented together and may also be due to the nature of the name itself. "Old Dutch Cleanser" obviously cannot be coffee or breakfast food, but "Bon Ami" could be anything.

Summary

It is important for the advertiser to set up an association between a product and the particular brand which he is promoting. Factors which serve to facilitate the formation of such association include frequency, recency, primacy, vividness, and emotional tone. Pleasant things are remembered somewhat better than unpleasant things which, in turn, are superior to neutral items. Associations are more rapid from a particular brand to a general product than in the reverse direction. Unfortunately, this is not the direction in which the association must operate in actual practice. The prospect thinks first of the need or the product and then of a particular brand. However, the principle of forward association may be used to offset the superiority of association from particular to general. If the advertising always mentions first the product and then the trade name, a strong association can be formed in that direction so that when a prospect thinks of the product he will be reminded of that particular brand.

Association tests are often used to determine brand familiarity. Some products have one brand which dominates in this respect which may be a challenge to the advertiser whose brand is not the dominant one. There is sometimes a discrepancy between the brand most familiar to a person and the one he actually uses, but this discrepancy may often be explained by reasons other than the ineffectiveness of advertising. Devices used to facilitate memory include ingenuity, rhyme, alliteration, and rhythm. In the case of the last of these a three-part rhythm has better memory value than a two-part. Arousal of activity regarding the product will help strengthen memory for it, for example, making some specified test of it. Contests are another instance of this type of motor reinforcement. A considerable number of moderate prizes is preferable to a single large one because more persons feel that they have a chance and will participate. Reminders are sometimes used deliberately for memory purposes, for example, sending the prospect some tangible object which is related to the product and which he will not throw away immediately. Narrative introduced into an advertisement sometimes helps. The curve of forgetting drops rapidly at the outset and then levels off. If follow-up procedures are used in direct mail, they should come soon after the initial presentation or else the material is forgotten, and it is necessary to impress the prospect again from the beginning.

Trade marks or trade names afford a simple means of identifying the product. They speed up purchase and make it possible to capitalize on the good will attached to a name when other products are marketed under the same name. They also protect the manufacturer and the consumer. Deliberate efforts sometimes are made to adopt a name which will confuse the public because of its similarity to some long-established name. The degree of confusion between litigated names can be determined experimentally by a recognition test. In some such tests it developed that names which the court had considered to be infringements showed no more confusion than did names which had been judged noninfringements. A trade name should be short, easy to pronounce, appropriate, difficult to imitate, if possible, and of such a nature that it will not go out-of-date. A trade mark can be better remembered if its shape is one that can be given a common name. It is also important for the trade name or the trade mark to be closely associated with the product.

25

ADVERTISING MEDIA

A FINAL CONSIDERATION in connection with advertising is the medium used for presenting the message to the prospect. There are many technical considerations here such as cost, planning a campaign, or circulation, which lie outside the field of psychology. However, there are a number of aspects of the different media which have a psychological slant.

Radio

More discussion of radio as an advertising medium is warranted because it is a comparative newcomer. This is not the place for a consideration of radio as a social institution, but, in a way, it is analogous to magazines and newspapers as a means of entertainment and information. One thing that makes for radio's appeal is its accessibility. The listener does not have to dress up and go out. Furthermore, except for the initial cost of a receiver, it is free. It affords a very effective means of relieving *ennui,* and a person can listen at a low level of attention while he is doing something else. The programs may be subtle in the way of arousing imagery and association which, of course, is useful in selling. Mild emotional experiences are quite frequent. A person may follow the excitement of the speaker or the actors. He may derive some satisfaction from the fact that the comedian is apparently dumb and his inferior. Curiosity is often involved in serial programs or in broadcasts from unusual locations. Programs from some far-away point are often of interest. Moreover, radio can be more personal than some of the other media, and the little girl out in Iowa may feel that the vocalist is singing his intimate song directly to her. Finally, radio-listening tendencies often become fairly habitual, so that one listens to certain programs with considerable regularity. All this indicates that the advertiser can count on many potential listeners, and hence, radio appears to be a favorable medium for him. The crucial point is whether the public listens to his particular program.

Measurement. Some techniques for measurement in this field including questionnaires, interviews by phone or in person, recording units placed in the receiver, and the arrangement whereby the members of the studio audience push red or green buttons as their feelings change during a program, were discussed in Chapter 22. With such techniques it is possible to ascertain program preferences and radio circulation with reference to time of day, or type of listener.

Attention problems. The fact that a radio receiver is operating does not mean that everybody in the room is listening to it any more than placing an advertisement in a magazine insures that it will be widely read. An initial consideration, then, is just how much attention the listener devotes to the program itself, and how much he devotes to the advertising portion. In the former connection, it is obvious that many persons do something else while listening to the radio, rather than devote their full attention to it. When a person is reading a magazine, he usually concentrates on it to the exclusion of most other things. However, many women turn on the radio while performing domestic duties, and in many instances it serves as a background for bridge, dinner, or light conversation. In one investigation something like a third of the persons sampled indulged in these co-listening activities. Thus, one problem for the radio advertiser is to insure that the program itself makes a strong claim upon the listeners' attention. This is similar to the problems of holding attention discussed earlier. If the program has a certain unity, the listener may be inclined to remain with it to a greater extent. A musical program centering, say, around Gilbert and Sullivan, might have more unity and claim more attention than one that ranged from Bach to Gershwin. A thing that is pleasant and attractive will hold attention more effectively. If the program can be somewhat personal, so much the better. Attention level may even vary with the time of day. In the earlier hours one may be listening incidentally while shaving or doing the dishes, whereas in the evening many listeners put on their slippers and relax.

With reference to attention to the advertising as distinguished from attention to the program, casual remarks and some interview data indicate that many radio commercials are unpopular, particularly if there is little variety in them. Some listeners apparently resent the presence of too much advertising or even of any at all, failing to realize that the advertiser is paying the bill for their entertainment. A thing that is disliked may not be very effective from an attention standpoint because there is a tendency to get away from unpleasant experiences. This suggests the desirability of making the commercial pleasant. The attention to the advertising is related further to the type of program. A musical program, can more readily serve as background for other activity and be listened to in the margin of attention than can a program involving a lot of speaking. It is probable that many listeners devote a low level of attention to the musical program, so that advertising which comes in as part of it will likewise be at a low level. If there is some interesting conversation on the program prior to the announcement, it may serve to get the listener's attention away from whatever else he is doing so that the announcement can ride in on this higher level. Another factor is the relation between the commercial and the program itself with reference to their compatibility. The difficulty was noted earlier of irrelevant pictures which do not fit in with the product and which set up conflicting associations. Similarly, a sudden change from an operatic aria to a statement about oral hygiene comes as a shock. Some advertisers, fortunately, have what might be termed "naturals" such as a piano manufacturer broadcasting piano music. It is a very easy transition from the concert to the qualities of the instrument. A magazine once had a very effective series which featured dramatic incidents from materials which were to appear in the forthcoming issue. There are other problems regarding the commercial announcement to which a final answer cannot be given from a psychological standpoint. In the earlier days the commercial was limited to a brief announcement to the effect that, "This program comes to you by the courtesy of so and so." This was given perhaps at the beginning and the end and during the middle of the program and was unobtrusive. The tendency nowadays is to introduce some selling points, but this may be overdone. The danger of overdoing it is more imminent on the radio than on the printed page, because the listener has less control over the medium. If the printed advertisement strikes him as too lengthy he can easily ignore it or turn the page. With radio, he must wait if he wants the rest of the entertainment, and there is a danger of arousing ill will if he has to wait too long. Apparently, some compromise will be most effective, and experimenting with the program analyzer (page 650) should throw light upon this problem. A practice which is successful if done cleverly enough, is to introduce the advertising as part of the continuity. Sometimes, the listener actually appreciates the cleverness of it. It may be given a humorous turn, and involve kidding the product a little, but the name registers, and the attention is adequate.

Announcer. The psychological problems regarding the radio announcer center around his personality. Listeners testify that they often wonder about the personality behind the voice. Investigations show that, to some extent, people can make judgments about personality from the voice, although there is no outstanding characteristic which seems to be judged correctly.[1] The fact that the audience does try to read personality into the announcer means that it would be well to check up on audience reaction to specific individuals. It should be remembered, too, that the announcer is coming right into the home, and an untoward aggressiveness or discussion of unduly intimate subjects may be resented.

Auditory *versus* visual. In the early days of radio particularly, there was intensive discussion of "eye *versus* ear." Publishers of printed media looked upon the newcomer askance and pointed to scientific statements of the proportion of experiences which are received through the eye. Actual experiments on this problem are difficult to control. The obvious procedure is to prepare typical advertising copy and present it both in a printed booklet and through a public address system and check for recall and recognition. One difficulty is the time aspect. Should the subjects read through the booklet once and should the announcer read the copy once? Silent reading is more rapid than reading aloud, and the radio would take longer for a single reading. Then there are problems of emphasis, such as the equivalence of a few words in bold-face type and of the announcer speaking more loudly or more slowly on those words. And what is the auditory equivalent of a picture in an advertisement? Thus, crucial experimental results are difficult to obtain. A few experiments, however, will be cited which are not unfavorable to the auditory presentation. Two series of eight trade names were selected in preliminary series so as to have about equal associations with the products and to be of about equal difficulty from the memory standpoint.[2] Copy was prepared comprising 70 to 75 words, with the trade name and the product mentioned three times. Visual presentation employed booklets and auditory presentation a public address system with the speaker in a separate room. The subjects were allowed one minute per page, and the auditory copy was given at about the same rate. Some subjects received one series of eight advertisements visually, and other subjects received those same eight orally, and *vice versa.* The order of presentation was also varied to average out any effects of primacy or recency. The results were checked by direct recall in which the subject listed all the products and brands he could remember, aided recall in which he was furnished a list of products and required to give the trade name, and finally recognition, in which he was given a product and four alternative trade names from which to select the one that had been presented previously. The results are summarized in Table 47. The first

---

[1] Cantrill, H. and Allport, G. W., *The Psychology of Radio,* pages 112 ff. New York: Harper's, 1935.

[2] Stanton, F. N., "Memory for Advertising Copy Presented Visually *vs.* Orally," *Journal of Applied Psychology,* 1934, 18, 45–64.

TABLE 47

Memory for Visual and Auditory Advertising *

	Immediate			*7 Days*			*21 Days*		
	Auditory	*Visual*	*Diff.* *σ*	*Auditory*	*Visual*	*Diff.* *σ*	*Auditory*	*Visual*	*Diff.* *σ*
Recall	3.6	2.7	3.1	3.8	1.7	12.8	1.5	.8	4.3
Aided recall	3.8	3.1	2.2	3.9	2.1	10.7	1.6	1.0	4.0
Recognition	6.8	6.6	.8	6.6	6.1	2.0	5.5	4.8	2.5

* Stanton.

row gives data for recall, the next for aided recall, and the third for recognition. The main entries involve the average number of items correctly recalled out of the possible eight. Each block of the table gives the auditory and visual scores and the critical ratio of their difference. The checks were made after different intervals of time as indicated. It will be noted that for unaided recall the differences are always significantly in favor of the auditory (critical ratio over 3.0). For aided recall, after seven and twenty-one days, this is likewise the case. With recognition the results are less significant statistically, although all are in favor of the auditory.

An investigation under practical conditions may be cited, although it was still more difficult there to control the other variables. This experiment was conducted in connection with a display at a state fair dealing with the use of fresh fruit. Observations were made for an hour of the number of persons entering the room who came up and looked at that particular exhibit. Then there were conspicuous posters calling attention to the display for an hour. Finally, an electrical transcription was given through a public address system in the room, for an hour, calling attention to the display. The statements in the transcription and in the posters were similar. Normally 20 per cent of those who entered the room looked at the exhibit. With the posters the figure was 25 per cent, with the transcription it was 32 per cent, and with posters and transcription simultaneously, 33 per cent. The transcription was slightly superior to the poster. This study was extended in the following manner. When each visitor left this room, he was given a slip inviting him to register for a prize contest across the hall. Those who registered answered a brief questionnaire about the exhibit including the fresh fruit display. If a person showed any memory for the fruit exhibit, he was asked further standard questions in order to derive a memory score. It was found that visitors who had entered the room while the transcriptions were being played remembered the details of the fruit exhibit about 57 per cent better than those who had entered the room when merely the posters were there calling attention to the exhibit. This difference was statistically significant. The difference was somewhat larger with women than with men, which suggests the possibility that women may be more habituated to the radio and remember auditory items better, but further investigation should be made on this point.[3] This study agrees with the laboratory investigation just mentioned, in indicating nothing unfavorable toward the auditory presentation.

Further data may be obtained by systematically employing different media and noting comparative returns. For example, a concern made identical offers in three media involving the return of box tops and then determined the cost per inquiry. In magazines the cost was $1.27, in newspapers $.36 and in radio $.10. Of course, other variables such as the content of the advertisement were not controlled, but the offer, at least, was identical.

In a door-to-door survey two groups of interviewees were matched for age, income, education, size of family, presence of magazines in the home and differed only in that members of one group had heard a certain radio program advertising a brand of soap and the others had not heard it within the past month. Inventories were made of spare soap in pantry and bathroom, and the listening group included 25 per cent who used the brand of soap advertised in the program in question, and the non-listening group only 14 per cent. Looking at it in another way, the interviewees were grouped into four classes in relation to the program—regular, frequent, occasional, and non-listeners. The use of the soap increased consistently from non-listeners up to the regular listeners. The use of three other competing brands of soap showed no relation to amount of listening to the program under consideration.[4]

---

[3] Elliott, F. R., "Attention Effect from Poster, Radio and Poster-Radio Advertising of an Exhibit," *Journal of Applied Psychology,* 1937, 21, 365–371. Also, Elliot, F. R., "Memory Effects from Poster, Radio and Television Modes of Advertising an Exhibit," *Journal of Applied Psychology,* 1937, 21, 504–512.

[4] Hausman, L., "Do They Listen to Commercials?" *Advertising and Selling,* April, 1944, 37, 34 ff.

Newspapers

Reading habits. A principal psychological consideration in connection with newspapers is the reader's attitude. The advertisement in the newspaper is in a complex setting with a great variety of competing material. Many persons develop the habit of reading it hastily. The newspaper make-up tends to promote this, with headlines which give a clue as to whether the article will interest the reader or whether he may well skip it. Presumably this habit of reading hastily carries over to the advertising material, so it is necessary for the advertiser to work more rapidly than in other media which are perused more slowly. However, along with this habit of reading quickly goes a tendency to react promptly if one reacts at all. People seldom procrastinate when they are interested in a sale advertised in the newspaper. Another phase of the reader's attitude is the voluntary as contrasted with the involuntary attention involved in certain newspaper advertising. One looks for a place to rent in the classified section, or deliberately seeks department store bargains, or hunts for ideas as to what to eat over the week end.

Flexibility. Another advantage of the newspaper advertisement is its flexibility. A New Jersey city had a big fire; a hardware concern sensed the opportunity, secured all possible fire-extinguishers from the surrounding region, ran full-page copy, and sold them all. The mere timeliness of the advertisement was what did the trick. Manufacturers of anti-freeze solution for automobile radiators often arrange a contract to the effect that the advertisement shall not be printed until the temperature has been below a certain point for three days in succession. Timing of this sort is possible only in a flexible medium.

Art work. The half-tone process reproduces photographs as an actual pattern of small dots. If these dots are the same distance from center to center a light effect can be obtained by having the individual dots smaller, and a dark effect results if they are larger. The distances from center to center are controlled by the size of screen through which the picture is projected, and the size of the dots results photochemically from the lightness or darkness of regions in the original photograph. With the cheaper stock used in newspapers it is necessary to employ a coarser screen for the half-tones or else the ink will run between the dots. Such pictures cannot be as satisfactory from the artistic standpoint. The individual dots stand out too distinctly and do not blend into a "photographic" effect.

Magazines

Attitudes. Two limitations of newspaper advertising just mentioned are less involved in magazine advertising. For one thing the magazine is more apt to be read at the end of the day when the reader is at leisure and relaxed, whereas the newspaper is often read while the reader is traveling and more hurried. This more leisurely attitude toward magazine content in general may carry over to the advertising so that it is not necessary for the advertiser to work quite as rapidly. If the copy has good initial attention value, it is not so urgent to tell the story in a hurry. The other point is that the magazine has the advantage of a better finished printing stock that will take finer screen half-tones, which, in turn, makes for better art work. The magazine stock also lends itself better to printing in several colors.

Direct Mail

Newspaper, magazine, and radio advertising operate in somewhat shotgun fashion. It is not known just what prospects are being reached. Direct mail, however, selects the prospects. If it is desired to reach only chemists, or business men, or artists, it is possible to obtain a list of persons in those categories and concentrate the advertising on them by contacting them directly. Incidentally, it should be mentioned that over 10 million pieces of advertising mail are destroyed annually by the dead letter office because of incorrect addresses. Mailing lists obviously should be correct and up-to-date.

Sales letters. A most obvious direct mail procedure is the sales letter. Here a crucial problem is to attract attention in such a way as to get the letter in the wire basket rather than the waste basket. Various attention devices discussed previously, such as color or pictures, may be used in the letter. Another problem is whether the letter is personal and apparently typed individually or merely a form letter reproduced in quantity. The personal touch is more effective from the attention standpoint. It may be possible to have the body of the letter printed and the address added in a typography sufficiently similar so that the letter seems personal after all. The automatic electric typewriter is another possibility. The address is typed by hand and the rest of the letter automatically on the same machine by a principle resembling a player piano. Or a letter may be written in longhand and reproduced by an etching process so that it looks natural. An even more personal touch may be possible, such as the picture of a rustic mail box with the prospect's own name on it in an advertisement promoting real estate (*cf.* page 707).

Other direct mail. Sometimes a broadside is used rather than a letter. This broadside, if opened up, has the advantage of size as an attention device. Envelope stuffers may be included with some other kind of material. A telephone bill, for example, includes in the same envelope promotional material which may build good will. Stuffers in pay envelopes however, must be handled with extreme caution, because opening a pay envelope is a delicate operation anyway. Another possibility is to include reprints of scientific articles, but this practice is limited to the type of prospect who would read and appreciate the article.

Sample. A convenient procedure for bringing the product to the attention of the prospective user is to send him a sample. This takes advantage of motor reinforcement to help impress the item more vividly on his memory. If he likes the sample, he will get more. One point in this connection is that the sample should be adequate for a real experience. A few mouthfuls of a food product are insufficient to determine whether the prospect likes it or not. He ought to have at least a helping, and furthermore, it may require a number of experiences to overcome a conflicting habit of using some other brand. The question of charging for the sample has its pros and cons. Giving away an expensive item may suggest that it is not worth so much after all. On the other hand, charging for the sample decreases the number of persons who will request it, but also avoids those who make a practice of collecting samples for ulterior purposes. Letting the prospects help themselves to the sample rather than sending it directly to them may lead to undue waste, because, although the sign says "Take One," they take three.

Specialties

Prospects frequently are sent some object with advertising printed on it which, while it is in use, serves as a reminder of the product. An alphabetical list of some 170 specialties runs from almanacs to yardsticks. The principal psychological consideration is the utility of the item. If it is something which the prospect will use periodically, it will have ample opportunity to remind him of the product. He also may be mildly grateful to the donor for having sent him a useful item. The specialty, however, should work satisfactorily. A blotter which actually smudges the copy does more harm than good. The specialty also should be adapted somewhat to its destination. The same type of calendar would not be appropriate in the bar-room and in the vestry.

Minor Media

Phonograph records are sometimes used to carry advertising. A small record with a brief advertising message is sent through the mail or delivered by messenger. The first time one receives such a record, it is difficult to resist the temptation to put it on and see what it says. After numerous experiences, however, the novelty wears off. Telegrams are sometimes used in direct advertising. Everyone is conditioned to react promptly to a telegram. This may work in a business office, but it is questionable practice with reference to the home. The housewife sticks her head out the upstairs window, the boy says, "Western Union," she comes flying down with imagery of accidents and hospitals, and then finds some innocuous advertisement. Thereupon the advertiser loses some good will. If the recipient tips the telegraph messenger that adds insult to injury. It is somewhat the same story with advertising over the telephone. The average domestic telephone is dedicated to social messages and contact with friends, and a "commercial" comes as somewhat of a shock. It is all right to suggest that the prospect use the telephone as a means of answering an inquiry which he receives through some other medium, because it is a convenient way of replying and does not necessitate hunting up paper and pen.

Cards on the streetcars or buses are quite effective from the attention standpoint. The rider frequently has nothing else to do. It may be too bumpy to read the newspaper, and it gets embarrassing to look at other people too much, so, by a process of elimination, he reads the cards. They may have the additional advantage that the advertisements the person reads on the way downtown to shop will have the element of recency. Moving pictures were discussed in an earlier connection. They would be an effective medium from a psychological standpoint except for the fact that the audience resents the advertising because they have no control over it.

Packages

In the earlier days most products were sold from the barrel. But grocers noticed that customers did not like to stand around waiting for the product to be weighed out and so, in slack periods, they weighed and wrapped standard quantities. This practice paved the way for the package wrapped at the factory. Another motive in addition to convenience was the hygienic nature of the sealed package. Manufacturers' attention turned also to the artistic aspect of the package and its ability to suggest atmosphere and embody some selling point. Package design, like the trade mark, may serve as a means of recognizing the product. A soup can with a red and white combination on the label facilitates ready identification of a particular brand. The package also provides an opportunity for inserts such as recipes, or suggested uses, or even advertisements for related products. If an insert is impossible, as in the case of soup, an outsert may be attached to the outside of the container. Along this same line are counter displays in which an attractive arrangement of packages may influence a person who is about to make a purchase. Some drug stores with open displays under the glass table top sold considerably more of the brands displayed than of those which were merely on the shelf. It is necessary, however, to avoid unpleasant associations in such a connection, for example, surgical appliances under the glass table top where sundaes are eaten.

Outdoor Advertising

Poster boards constitute perhaps the most widely used type of outdoor advertising. If they are located where much of the circulation consists of motorists, it is undesirable to attempt too much in a single display because the driver has other things to do and will not stop the car to read the advertisement. Poster board advertising often is criticized on the ground that it clutters up the landscape. The advertisers themselves are aware of this difficulty and often exercise a wholesome discretion in the location of displays. Sometimes they clean up a vacant lot which has been littered with junk, landscape it with gravel walks and evergreens, and use it as foreground for the poster board. The net result is a better appearance than before the board was put up.

Scientific investigation of outdoor advertising calls for special techniques. Reproducing posters in the laboratory is not satisfactory because they are smaller and the total situation is different. One method has the subjects driven by posters and then gives recall and recognition tests for what they observed. Another possibility is to attach recording devices to the subject riding by the displays to discover just where he looks and when.[5] It was shown, for example, that at least a third of the subjects who were carried by certain poster boards did not look at them at all on the first trip. Much depended on the distance of the poster from the street, on the number of boards involved in a given series, or on adjacent objects competing for attention. There is a little tendency for the attention to go to the right of the highway rather than the left. The approach to the board is another factor. Some may be seen through open country,

[5] Ringwald, J. C., *An Investigation of Some Psychological Factors Involved in Poster Advertising.* Ph.D. Dissertation, Ohio State University, 1931.

whereas others are approached suddenly around a corner. Experiments suggest that in the latter case there is a slight advantage, perhaps due to the contrast between an uninteresting building and the large, colored board. There are indications, too, that the effect of primacy is not as significant here as in the usual situation. In one investigation it appeared that a person had to pass two or three boards before he began to notice them, so that the initial one was not as effective as one a little farther along in the series.

It often is feasible to provide artificial illumination for a poster. If its location is away from other illuminated regions it has the advantage of isolation (page 699). In the case of the large electric sign this aspect may be still more striking. The intensity of illumination relative to the background is of importance (page 695).

Good Will

The advertiser or the salesman is not interested merely in making a sale, but in making a customer. In the early days this was not always true. The peddler who went from town to town, held forth at the crossroads, put on a dramatic demonstration, sold his remedies, and got across the county line ahead of the authorities would be a case in point. He did not expect to return and could spend his life in this manner without exhausting the market. Nowadays, however, the retailer hopes to sell the same family another package of cereal next week, and to that end must have satisfied customers. Good will cannot be dismissed with a shrug of the shoulders as a philosophical concept or an accounting device, for it actually means dollars and cents. The mechanism is similar to that discussed in connection with industrial morale, namely, the tendency for an attitude or feeling aroused by one item to spread and color something else which is related. A little annoyance produced by a loose contact on an electrical appliance, or the failure of an automobile to deliver the mileage prescribed, or a breakdown at some crucial time may produce a dislike for all aspects of the appliance or automobile. Similarly, a tactless remark over the counter by a sales person may break up the customer's buying habits with reference to a particular store.

Measurement. The determination of good will is somewhat analogous to the determination of industrial morale. It is necessary to interview people and, preferably in some blind fashion, ascertain their attitudes toward a particular product or institution. For example, interviewers had people rate a series of items as to whether they found them annoying, neutral, slightly pleasant, or very pleasant. The list included city parks, the sewage disposal plant, and some stores. The actual store under investigation was buried in the list, and its standing in the hierarchy was determined without the interviewer's knowledge.

Quality. One of the obvious factors conducive to good will is the quality of the product. If it gives good service or is otherwise satisfactory, people will like it and will purchase more of it. Advertising often stresses quality, and it is important for the product to measure up to these claims. Sometimes purchasers attach a good deal of significance to some index of quality. One of the women's magazines maintains a testing institute which places seals of approval on certain products. The manufacturer of a washing machine finally decided that this seal was superfluous because customers never mentioned it. He discontinued its use, until he found that customers and dealers very soon began to inquire about it.

Public relations. Quite apart from the quality of the product, much depends on just how the personnel dealing with it behave in contact with the public. Large stores train their sales people in better methods of meeting the public, hoping that more friendly and patient behavior will bring dividends in the way of favorable attitudes toward the organization. Service shopping often detects service failures and corrects them. The complaint department is another place where much effort is devoted to public relations. The waiting room is usually comfortable so that the client can become relaxed and unemotional before the actual interview. Similarly, when customers come in and talk to somebody about service or allied matters an adept employee can do a lot toward building good will at just that point. Some of the utilities have a routine practice of listening in to some of these interviews, noting the good and bad points, and making constructive suggestions to the employees. Some institutions have a policy that "the customer is always right," and although they occasionally take a beating from unscrupulous customers, it pays dividends in the long run. If an irate customer protests that a machine will not work, and the irascible employee suggests that the customer broke it, that ends a potentially fine relationship. The adjustment representative should take the complaint as an opportunity to create an even more favorable attitude toward the concern.

Some of the contacts between the customer and the concern take place in the home. Representatives enter to read meters or to install telephones. An uncouth representative may be a liability. One utility improved public relations considerably by putting uniforms on their meter readers and schooling them in fundamentals of courtesy, such as wiping their feet, removing their hats, and saying, "Please" and "'Thank you." It may be that having the power shut off for a time is not nearly as critical a matter as the appearance and conduct of the employee who comes in to fix the fuse or read the meter.

Another focus for public relations outside the office involves commercial vehicles. If one of the drivers makes some flagrant violation of automobile courtesy, it reflects unfavorably on the concern that owns the truck.

Mail. Customers sometimes write letters of inquiry, complaint, or commendation, and the handling of such letters has a good will aspect. For one thing the letter should be answered promptly if it is the type that requires a reply. One investigator sent in coupons for thirty-three products and recorded the number of days required for the reply to reach him. The period varied from one day to forty days, and some never came. Some manufacturers merely send the promised sample with no comment. On the other hand, a rug company sends a 56-page catalogue, a broadside of testimonials, a tape measure for measuring the room for rugs, and several follow-ups. Acknowledging all radio fan mail might be prohibitive, but sometimes particular letters can be spotted which do afford an opportunity for a nice piece of good will. For example, a man in Texas wrote the sponsor that the last note of the "Yo-Ho" in the theme song hurt his ear. The sponsor saw the opportunity and replied that the respondent and Beethoven were very much alike in that respect, and furthermore, on a certain night, just for his special benefit, they would change the last note of the theme song. They actually made the change on the night specified. Naturally, he had all his friends listening, and, thus, a small group of Texans had a favorable attitude toward this concern ever after.

Sources of annoyance. It may be well to note some annoyances which may work against good will. One of these sometimes arises in connection with installment financing, when the concern turns the account over to a finance company. The customer received courteous treatment from the original organization, but now the finance company goes at him in a gruff, businesslike fashion, and this intrusion of a stranger in what seemed like a nice relationship irritates him. Contests were mentioned earlier as a possible source of ill will on the part of those who fail to win the contest. Such losers often feel that there was injustice on the part of the judges. The only remedies are to secure judges of unimpeachable reputation and to have more prizes.

Service is a final factor which may contribute to good will. The new automobile is given several free inspections or the electrical appliance is serviced for a year. By that time, if anything goes wrong, the prospect feels that it was his own fault and not due to a defect in the product.

An early failure, however, is blamed upon the manufacturer with resulting ill will. Then, there is the type of service which does not involve the product directly, but something connected with it. The automobile service station sells gas and oil, but also checks tires and batteries. The older generation that remembers when the driver inflated his own tires appreciates this service more than the younger generation that has grown up with it. At any rate, the provision of such ulterior service does contribute somewhat to good will. This point of view is epitomized in the slogan that the sale is not completed until the buyer is satisfied.

Resisting Advertising and Selling

The academic psychologist is sometimes chided by colleagues for teaching students how to "sell" people but telling them nothing about how to resist sales efforts. A few hints in this latter direction are in order. As far as advertising is concerned, the best way to resist it is not to read it. If a person is susceptible, he should not sit down leisurely and thumb through a magazine, looking at the things that interest him, but should refer to the table of contents, look up the articles he wants to read, and stick to them. On the radio, if he feels that he is not immune, he may systematically throw the switch at the times when the commercials are presented. In most instances, a person can deliberately avoid the advertising stimuli if he sets out to do it.

The more difficult problem is the personal salesman. Assuming that the prospect is not in the market for a given product and does not want to be sold, there are a few things which he may bear in mind when he is in the presence of the salesman. One item is posture. A prospect who is seated while the salesman is standing is somewhat at a disadvantage because of their relative position. Being below the salesman physically may produce a slight feeling of inferiority, and lead the prospect to be more suggestible. Some concerns have gone so far as to recruit sales persons of large stature on the theory that they could dominate the prospect. There may be something to this, but it can be broken up, usually, by watching the relative posture of the two participants. It is a good idea to contrive to get the salesman seated, and it may help the prospect to sit on the desk himself, so that he is in a superior position. Ingenious devices may be used to break up the initial approach. One commercial buyer has his office arranged with a slight rise in the floor just in front of his desk so that the salesman stumbles slightly and reaches the desk in a somewhat awkward posture. Others use a swivel chair with a weak spring which tips backward unexpectedly. The main recipe, however, for resisting the personal salesman is to let him do most of the talking.

Above all, don't argue with him or raise objections to the product. His organization has already collected every objection that has ever been raised to the product, and the salesman has had access to a catalogue of all those objections. Moreover, the catalogue includes the answers to the objections which the salesman presumably has studied. Hence, the prospect is licked before he begins arguing against the product. Furthermore, the salesman often needs certain commitments from the prospect in order to carry through his program. He wants to know, for example, how much insurance the man carries. If the man does not tell him, it is difficult to convince the prospect that he needs more without some starting point. The best technique is to let the salesman talk. He starts out with some convincing statements and presently asks the prospect what he thinks about them. The prospect then says he is not interested in buying, but would be glad to hear anything else the salesman has to say. After a few more selling points the same routine is repeated. Just a few stages of this are usually sufficient to end the interview. Then if, at just the right moment, the prospect rises from his chair, the salesman will imitate him and be at the door before he realizes it. It is surprisingly simple but surprisingly effective.

Summary

Radio is an effective advertising medium because it is easily accessible, provides entertainment free, does not always require a high degree of attention, may involve an apparent personal touch, and may become habitual. The use of questionnaires or interviews to determine radio preferences and listening habits has been mentioned elsewhere. There is a further question of how much attention is devoted to a particular program because frequently there are co-listening activities. This tendency may vary with the type of program and with the time of day. There is also the question of attention to the commercial announcement compared to attention to the program. If the latter is functioning at a low level anyway, as in the case of a musical background for other activity, the transition to a high level of attention for the commercial is improbable. There has been considerable controversy and some research on the comparative merits of visual and auditory presentation. Although it is difficult to control other variables in such experiments, the results are not unfavorable to the auditory method.

Reading habits are an important consideration with reference to newspapers as an advertising medium. The usual tendency is to peruse the newspaper hastily, which means that the advertiser must work rapidly. This point would not apply, however, to classified advertising which involves voluntary rather than involuntary attention. Newspaper advertising is flexible and can be changed overnight. The art work in newspapers cannot be as adequate as in a medium which uses better paper because the newsprint necessitates a coarse screen for the half-tones. Reading habits are more leisurely with magazines so that it is not necessary for the advertiser to tell his story so rapidly. Moreover, the finished paper makes better art work possible.

Direct mail can select the prospects to whom the advertising is presented. The sales letter is the most obvious instance, and devices for securing initial attention and keeping the letter out of the waste basket are important. If the letter can appear to be a personal one, so much the better. Other direct mail devices include broadsides, envelope stuffers, and samples. The sample should be sufficient to give a good trial. Charging for the sample reduces the number of persons who will be reached but eliminates many whose interest is not genuine.

Specialty advertising distributes objects which have some other use but carry a bit of advertising. The value of this medium depends largely on the utility of the item and whether it will be seen frequently. Phonograph records containing a sales message sometimes are used. Telegrams of an advertising character may be satisfactory at an office but are inadvisable in the home. Advertising by telephone is a questionable practice. Cards on the streetcars may be quite effective because the rider has nothing else to do but look at the advertisements. They also sometimes have the element of recency if the prospect is on the way downtown for shopping purposes. Aside from their utility, packages may create appropriate atmosphere, and the design may facilitate recognition of the product. Inserts or outserts with further advertising may be used in connection with packages.

Outdoor advertising presents some unique problems, and special techniques have been devised to investigate them. The distance of poster boards from the street, other stimuli competing for attention, and the location in a series of boards influence the effectiveness of a given advertisement. Intensity of illumination and isolation sometimes operate to make an outdoor display effective.

A manufacturer should be concerned with the good will of the customers so that they will purchase repeatedly. This characteristic may be measured by techniques somewhat analogous to attitude scales or by means of interviews. The mere quality of the product often promotes good will. Various aspects of public relations may contribute, such as courtesy on the part of personnel, handling complaints diplomatically, and being careful about the behavior of representatives who go into the home. There are possibilities of good will in the way that letters and inquiries are handled. Sources of annoyance should be avoided, for example those that arise in financing installment purchases. Finally, servicing the product or rendering ulterior service somewhat related to it makes a distinct contribution. A good principle is that the sale is not completed until the buyer is satisfied.

A final word is in order regarding resisting advertising and selling. The susceptible individual should limit himself and deliberately avoid sales talks on the radio or ads in magazines if he wishes to resist.

With reference to personal selling, it is a good idea to keep the salesman from getting a superior physical posture. He should be given the minimum information and he should be allowed to do most of the talking. It is useless to argue with him, but respectful listening interspersed with insistence upon lack of interest in the product will usually suffice.

26

OUTLYING FIELDS

WE HAVE NOW COVERED the major fields in which psychology has made extensive contribution to practical problems in education, medicine, law, and business. It may be well to conclude the discussion with a glance at some of the outlying fields for applied psychology. Some of these may have been touched upon incidentally in another connection, so that a mere passing mention will suffice in the present context. It is difficult, anyway, definitely to limit the field of applied psychology because almost any life situation is fraught with practical psychological considerations. However, most of the experimental work has been done in the four fields mentioned above, and the approach to many of the others to be described has been *a priori* rather than empirical. Nevertheless, it is well to mention these for what they are worth. It may help to subdivide the discussion into three aspects. The first is what might be termed life enjoyment which includes some of the arts, both visual and auditory, recreation and its special manifestation in athletics. The second comprises media for communication and for influencing people such as public speaking, writing, drama, movies, radio, television, and the press. The third might be termed social progress and includes public opinion and its control, politics, religion, war, and peace.

Life Enjoyment—Visual Arts

Reasons for liking or disliking art products. One of the psychological factors involved in liking or disliking art products is empathy. This is the tendency to feel one's self into a situation (page 720). A person projects himself into the pictured landscape and walks along the brook; if a design appears lopsided he feels like straightening it up; and if an archway has the keystone upside down he feels like catching it. Even appreciation of curves may involve a tendency to feel oneself traveling along the curve without interruption. Apparently it is not a matter of the eye sweeping smoothly along the curve, because photographs show that the eyes move in straight lines from point to point on the curve.

Another factor is termed psychic distance. This means that the art object is more acceptable if it is not too close. A marble statue is more artistic than a waxwork. The latter is too much the real thing, and the former gets some of its charm from the fact that it is more remote.

A third factor which often contributes to pleasure in art objects is the associations which they bring up. Perhaps the painting reminds a person of Cape Cod where he spent pleasant summers, and he likes it all the more for that reason. On the other hand, if it reminds him of unpleasant things, even though it is good art, he may find it difficult to accept and enjoy the painting. These associations also may derive pleasure from a certain element of escape. If the picture reminds a person of something remote in time or place, it tends to get him away from unpleasant things in his present environment. Systematic study of some art principles has been made in the psychological laboratory using, for example, the paired-comparison technique (page 496) in which each item in a series is paired with every other one for a judgment on preference. The investigation of the "golden section" would be a case in point.

Development of art appreciation. The role of the school in developing art appreciation was mentioned earlier (page 104). The discussion centered around exposing the children to artistic objects in the school environment and inducing them to go through the motions of acceptance and to imitate the enthusiasm of the teacher. It is to be noted that art appreciation is not limited to persons with technical training. An experiment described elsewhere (page 720) employed sketches, some agreed upon by experts to be good art and others involving some violation of art principles. It developed that persons with no art training selected the accepted treatment much more frequently than they would do solely by accident.

Music

Reasons for general preferences. When we turn from visual to auditory aspects of life enjoyment, we find that an important problem in reaction to music is preference for different tonal combinations. An experiment was conducted by the paired-comparison technique with different pairs of tones. The average order of preference was as follows: major third, minor third, octave, major sixth, minor sixth, fourth, tri-tone, fifth, major second, minor seventh, major seventh, and minor second, although there were marked individual differences.[1] There are indications, however, that, with experience, such preference changes. If the tonal combination becomes too simple and too easy to grasp as a unity, it becomes less interesting. In one study persons made an initial order of preference like that indicated above and then were subjected for a considerable period to prolonged listening to one of the simpler intervals such as the major third. When the ranking procedure was repeated, their preference for the major third now had decreased, and they preferred some of the more complex combinations. At one time the more dissonant intervals were disliked and even ruled out by the church.

---

[1] Beebe-Center, J. G., "Pleasantness and Unpleasantness." *Psychology*, edited by Boring, Langfeld, and Weld, Chapter XV. New York: Wiley, 1935.

There are indications that preferences for rhythms are influenced by experience, too. An experiment was conducted with 700 girls in a trade school. They were given various series of tempos on a metronome and asked to indicate, for each speed, whether they liked it or not. The details of the technique need not be described, but they involved presenting the rhythms in ascending and descending order with certain cross checks. Commercial typists liked a tempo of about 178 per minute, and power machine operators 161, whereas beauty culturists and dressmakers preferred 139 and 134 respectively. The first two groups had worked in situations involving a rapid tempo. It appeared as though the industrial experience with situations involving different tempos had, to some extent, conditioned the preferences.[2] It is possible, of course, that these people had some fundamental liking for certain tempos, and, as a result, took up work in the trade school that fitted in with their preferred rhythm.

Reasons for enjoyment of specific selections. One reason a person likes some particular bit of music is emotional conditioning. He may have experienced the selection in a situation that had emotional content, and the emotion was transferred to the selection. The popularity with the older generation of radio programs that feature music from the Gay Nineties is due to this mechanism. A selection that was popular in one's college days will take one back to the Junior Prom or a class sing. Moreover, a given selection may be reconditioned in a different setting. The Alma Mater song of Ohio State University is really an old hymn with local words, and "Fair Harvard" actually is "Believe Me, If All Those Endearing Young Charms." The music takes on an entirely different emotional significance in the campus context.

Another factor in musical preference is familiarity. A well-known selection is comfortable like an old shoe or an accustomed chair by the window. This can be observed at almost any concert when the artist plays a familiar encore. Another manifestation, which is irritating to some listeners at the small town band concert, is when some of the folks whistle the melody if it is familiar.

---

[2] Foley, J. B., Jr., "The Occupational Conditioning of Preferential Auditory Tempo: A Contribution Toward an Empirical Theory of Aesthetics," *Journal of Social Psychology,* 1940, 12, 121–129.

The matter of "distance" plays a role in some musical situations just as it does in sculpture. Many listeners prefer opera in a foreign language where they do not get every word. Grand opera in English often sounds silly. It should be noted, however, that the Italians apparently enjoy Italian opera very much, so the principle is not universal.

A debatable question is the psychological factors involved in preference for classical *versus* popular music. It is possible, of course, to condition a person to like one or the other. Classical music may stimulate curiosity more, because the mechanics are not so obvious if a person is trying to enjoy it in an intelligent fashion. Someone has compared it to a fence covered with vines instead of with strands of wire. Popular music, on the other hand, often gets its appeal from additional factors such as its association with dancing or in reminding one of a dance. Then, too, the saccharine words may set up daydreams with emotional sequences. In some situations the popular music involves visual as well as auditory experiences. A common phenomenon which interests the psychologist is the contortionist blowing a trumpet with a derby on the end of it, or the drummer in what appears like an acute manic phase.

Developing music appreciation. Methods for developing appreciation in this field are quite similar to those mentioned in reference to the graphic arts. If a child is exposed to a particular kind of music sufficiently, he is apt to develop a liking for it. Further, if he goes through the motions of accepting and liking it, this tends to bring the corresponding emotion. Many people doubtless attend the Opera at the outset because it is the thing to do and because it affords an opportunity for social contacts and display of finery. However, by going through the motions of appreciation and telling their friends how nice it is, they ultimately develop a liking for the music. Youngsters often perceive rhythm before they perceive melody. The rhythm also promotes dynamogenic reinforcement and brings a certain pleasure from this kinesthetic aspect. If their initial musical experiences involve quite obvious rhythms, they will enjoy the experiences, and a transition can be made presently to appreciation of the melody also.

Musical aptitude and ability. There is some interest in how musicians get that way. Tests for musical aptitude have been developed by Seashore and others. They are administered by phonograph records and involve such aptitudes as pitch discrimination and time discrimination. It is difficult to determine the comparative extent to which musical accomplishment depends on innate and acquired factors but it is probable that at least some of it involves native capacity. There are limitations in such aspects as size and kinetics of the fingers or the construction of the vocal apparatus, but this is not the whole story. Sparrow's eggs were hatched by canaries, and the young sparrows lived with the canaries and never heard another sparrow. To some extent, they acquired the song of the canaries. This suggests that there is some hope for the average youngster who wishes to study music.

Ulterior uses of music are discussed elsewhere. Martial music and community singing have obvious contributions to morale in wartime. Industrial production has been increased and employee attitudes improved by providing music intermittently during the day (page 552). In church the organ and the hymns are conducive to a religious atmosphere and carry an element of suggestion. In a sales situation a musical background in a display room has a salutary effect on customers (page 662). Politics has its campaign songs. Music may even serve as an outlet or sublimation for the individual. A person who likes to play the piano sometimes takes it out on the piano when he has an emotional disturbance and gets a certain amount of relief in that way.

Poetry

Another of the auditory arts is poetry. Comparatively little scientific investigation has been made of this medium. One problem is whether the enjoyment results from the sounds, pure and simple, or from their meaning. Evidence is somewhat contradictory. One study recast some familiar poetry into jabberwocky, which maintained about the same consonant and rhythm arrangement. Subjects revealed differences in preference for the works of different poets recast in this fashion as though there was something about the sounds which carried pleasantness or unpleasantness quite apart from the meaning. Other investigations, however, have found meaningless sounds to differ less in pleasantness than did meaningful ones. Apparently both factors are operative.

Rhythm. Poetry involves rhythm, and the same psychological mechanisms may operate as in the case of music. The reader may synchronize with the rhythm in motor fashion. It is easier to remember things which are given in meter because they are grouped into systematic units and it is unnecessary to introduce one's own grouping. In general, the rhythm should not be too complex for the person who is to enjoy it, especially for children.

Meaning. The meaning of a poem may bring pleasure because of its association with things that have emotional significance. The vocabulary as compared to the vocabulary of the readers is important. It is possible to shoot over their heads. This may be demonstrated by reading a poem to youngsters and asking them to put it in their own words. It is obvious in some cases that they miss the point completely and that the vocabulary is beyond them.[3] Too much of this may arouse an antagonistic attitude and handicap the later development of literary appreciation.

Recreation and Athletics

Another factor which contributes somewhat to enjoyment of life is recreation. This has some over-all benefits in the way of providing release and emotional outlets. Including a moderate amount of it along with one's regular job has some bearing on problems of fatigue. There is also the social aspect because many types of recreation involve other people and therefore tend to promote more adequate social relations generally. Little scientific work has been done upon psychological aspects of recreation except for athletics. The impetus for such work may have come from the fact that it sometimes appears very important to win the game. At any rate, some psychological aspects of athletics are worth discussing.

Aptitude. The measurement of aptitude for athletic performance involves the same approach discussed in connection with aptitude tests in industry. An investigation was made, for example, of the reaction time of members of a football squad. They reacted to the simulus by charging forward and it was so arranged that when the head moved, it made an electric contact which operated the chronoscope. The average reaction time for the entire initial squad was .389 seconds. When the squad had received its first cut, the average for the remaining members was .382 seconds and the eleven men who started in the major games averaged .353 seconds. Obviously quicker reaction time characterized the more effective players.[4] In a battery of motor skills—pursuit of a moving target with a stylus, packing spools in a box according to a certain pattern, and turning a small crank rapidly—a group of successful athletes did better than a random group of subjects in about every test.[5] Another pertinent aptitude is memory for such things as signals or plays, or even the idiosyncrasies of various batters.

Perceptual factors. Peripheral vision plays a considerable role in athletics. A safety man catching a punt must watch the ball but also observe the approaching ends in his peripheral vision. A passer does much the same thing when he is noting the entire field and spotting a recipient for the pass. A shortstop watching a grounder sees in the margin of his visual field that the runner on third is coming back instead of trying to go home and that he has time to throw out the batter at first. There would not be time to catch the ball, look directly at third base, and then decide what to do. A basketball player dribbles the ball while observing it in the periphery and watching the other players directly. Much the same thing is done in hockey. The importance of good peripheral discrimination is obvious in such cases. The inadequacy of color vision in the periphery is a serious factor in some athletic situations. Members of a basketball team were coached to look apparently in one direction while passing the ball to a team-mate at the side. This had worked all right in practice because one team wore light jerseys and the other dark, and the two degrees of brightness could be discriminated in any part of the visual field. But in a crucial game both teams wore colored jerseys which appeared equally gray in peripheral vision so that it was impossible to distinguish friend from foe, and the players often passed the ball to the latter.

---

[3] See Irion, T. W. H., "Comprehension Difficulties of Ninth Grade Students in the Study of Literature." *Teachers College Contributions to Education, No. 189,* 1925.

[4] Miles, W. R., "Studies of Physical Exertion: Individual and Group Reaction Time in Football Charging," *Research Quarterly,* 1931, 2, 5–13.

[5] Husband, R. W., *Applied Psychology,* p. 593. New York: Harper's, 1934.

Another perceptual factor is the judgment of distances. An end runner must judge which men he can clear by noting comparative speeds. A decision must be made in fielding a bunt as to who is the nearest to the place where the ball presumably will arrive. Kinesthetic factors may also play a role in gymnastics.

Attention. The range of attention determines how many other players one can observe simultaneously. Similarly, a judge of a race cannot watch all the runners and then pick the third one. It is necessary to have each judge set for a single runner—one judge picks the first and another the second—thus limiting the field of attention to something with which each can cope. Distraction of attention often impairs athletic performance. The coach on first base may make deliberate efforts to distract the pitcher's attention—a practice considered questionable in the better circles. On the other hand, in some sports deception in the form of misdirecting attention is part of the legitimate strategy. One football player directs the attention of the opposing team to the right while the actual play goes to the left. It is very much like sleight of hand. Many of the breaks in the game may be due to a momentary lapse of attention on the part of some player.

Training athletes involves the same basic principles of learning such as repetition, initial stress on accuracy, and motivation. There are some possibilities of training athletes in rapid perception analogous to the "recognition" training given to military personnel in the rapid perception of aircraft or surface craft. It is doubtful whether reaction time can be shortened by practice, but it is possible to develop the most effective set with which to await a stimulus. If a person concentrates his attention on the approaching stimulus, he reacts more slowly than if he concentrates on the prospective motion. In a typical experiment a motor set yielded an average reaction time of .18 seconds, whereas a sensory set gave .29. Apart from set, reaction time is largely an individual matter. There was the case of a tackle with a very slow reaction time who was coached to charge on the signal preceding the actual starting signal. He thus got underway at the right moment and, in fact, received favorable comments from the press for being such a quick starter.

Public Speaking—Psychology of the Audience

Preliminary considerations. The second major division of the outlying fields of applied psychology is communication and influencing people. Aside from everyday conversation, there are some psychological factors involved in speaking to a group or audience.

Quite apart from the behavior of the speaker, something depends on the place where he operates. In a dimly lighted cathedral the atmosphere is solemn, the audience feels small by contrast with the architecture, and group feelings and attitudes are minimized. On the other hand, a cozy room with a low ceiling is conducive to *esprit de corps*. Bright lights while the group is gathering promote cheerfulness, contribute to social unity, and weld the group somewhat into a crowd. Additional light on the platform when the speech begins will help to focus attention there.

If the members of an audience sit closely together they constitute more of a social group, and influence one another by way of social facilitation (page 519). If they are scattered about the room, the speaker has to work on them individually rather than collectively, which is more difficult. The atmosphere of the room may be influenced by special associations between that place and some kind of material or activity. A case in point is the Lenten service in a theater. The place is associated with amusement rather than with religious observance, and it is difficult for some members of the group to shift to the latter attitude.

Getting attention. A speaker often has the problem of securing the audience's attention. Mechanisms that contribute to this end are similar to those discussed in connection with advertising and selling, and may be classified as mechanical and interest devices. The former includes changes in intensity by shouting or banging on the table or doing something unusual. Mechanical devices are more necessary for the young or stupid than for an intellectual audience. The Surprise Symphony was alleged to have been designed to keep the royal youngsters awake by sudden changes in intensity. Devices of this sort are effective and useful, especially in emergencies. Showing a chart or some apparatus or even picking up a piece of chalk serves to reawaken attention. Incidentally, it is inadvisable to look at one's watch too obviously because the audience will do likewise and then get restless. Voice quality, of course, contributes, and a monotonous delivery militates against good attention. Some speakers find it profitable to listen to a transcription of their own voice. Gestures and changes of tempo may help. An experiment on these mechanical attention devices was conducted by presenting a short biography of a fictitious person and varying the method of emphasizing certain statements. The comparative scores for different methods of emphasis were as follows: five repetitions of a statement in the course of the talk, 315; three repetitions, 197; the words "now get this" just before making a statement under investigation, 191; "did you notice that?" prior to the statement, 154; a pause, 143; a loud statement, 126; a gesture, 118; a bang on the table along with the gesture, 115. A score of 100 resulted when no deliberate emphasis was given. Obviously some of the above modes of emphasis were effective.[6]

Mentioning novel or unusual things may be helpful interest devices for catching the attention of the audience. Curiosity is an effective motive and may be aroused by asking a challenging question and getting the audience wondering about the answer before it is divulged. Giving them the inside story is intriguing because everyone likes to learn something secret. It also arouses interest to mention things which are in line with the audience's own wishes.

Holding attention. Attention on the part of the audience should be a continuous process, but unless special effort is made, attention is apt to wander. One method of holding attention is to maintain adequate rapport. This is simply an attitude of mutual confidence between the speaker and the audience. Much depends on how the speech begins—a mention of previous contact with some members of the audience or the ubiquitous story. This latter should not be trite or forced. If the audience is somewhat hostile, it may be in point to work on particular individuals in the front part of the room—talk directly to them and smile at them. They cannot be too openly hostile as the speaker might recognize them later. Those who are incognito are more apt to cause trouble. If the first row can be won over to a more favorable attitude by this direct approach, then their attitude may spread. A certain amount of "we" in the discussion may help as the speaker thus identifies himself with members of the group. This is facilitated, as suggested above, if the group is compact.

---

[6] Jersild, A., "Modes of Emphasis in Public Speaking," *Journal of Applied Psychology,* 1928, 12, 611-620.

Another method of holding attention is to get the audience to participate in some kind of activity. Ritual and ceremonial are obvious instances. Group motions done synchronously with the speaker enhance his prestige and tend to direct attention to him. Along the same line are hymns or patriotic songs. Merely applauding lends some direction to attention. Rhetorical questions sometimes serve this same purpose, even though the audience does not necessarily answer them audibly.

Variety, which may involve voice, or gesture, or facial expression, helps maintain attention. The speaker may well watch the audience for evidence of restlessness. If they seem quiet and attentive, he knows that things are going well. In this connection there is experimental evidence that reading a speech from a manuscript is less effective than giving it extempore or from notes. A speech of about five-minutes duration dealing with the life and achievements of a well-known scientist was presented to two comparable groups of students. In one instance the material was read from a manuscript, and in the other the same speaker presented identical material extemporaneously with every effort to keep time and emphasis the same. On the average, 27 per cent of the details were remembered when the speech was read, and 37 per cent when it was given freely.[7]

Distractions should be minimized from the standpoint of keeping attention. Persons on the platform behind the speaker operate as a distraction. Coughing or making grimaces takes attention away from the main point. Noises outside the room, of course, are unfortunate.

Appeal. A final psychological consideration is the appeal or the actual method used to persuade the audience—if persuasion is an objective. Here again the problem is similar to that found in advertising and selling. One possibility is to employ suggestion, that is, simply build up an idea and keep it vividly before the audience to the exclusion of conflicting ideas. It will be recalled that negative suggestion is inadvisable in selling because of the danger of dissociation and the prospect's getting the idea of doing what he is told not to do. In public speaking, however, negative suggestion may be used deliberately to produce the dissociation and plant the opposite idea. For instance, "I am not here to try to prove that the —— Party will put a chicken in every pot, but . . . ," or "It is not my intention to claim that the defendant deliberately put this money aside." This procedure gives just the suggestion which the speaker says he is not going to discuss. Again, indirect suggestion may be effective here just as in selling. A candidate is described in a favorable setting or a proposal is attributed to some well-known person instead of the speaker.

---

[7] Moore, H. T., "Attention Value of Lecturing Without Notes," *Journal of Educational Psychology,* 1919, 10, 63–70.

In connection with appeals it is well to recur to the earlier discussion of the relative importance of emotion and reason in convincing people (page 674). Empirically, a much higher correlation was found between belief and desire than between belief and evidence. Thus, although the listener may think that he is rational and may like to be appealed to as hard-headed, a clever speaker will mention things that the listener probably wants anyway and then gradually work around to the point which the speaker is trying to establish. Emotionally toned words often carry some weight. If an item is labeled "Communist" or "Fascist," the mere label "convinces" many listeners that the item is undesirable. Another possibility is to make a proposal appear like something that everybody is doing or believing. Majority opinion or the so-called "Band Wagon attitude" carries a lot of suggestion. This has been demonstrated experimentally (page 308). It is easier to get a group to unite *against* something than to unite *for* something. A common enemy has a unifying effect as long as the enemy remains common.

A final type of appeal is rationalization, which combines suggestion or the emotional appeal with rational considerations. A speaker may convince the audience to take some course of action, or vote a certain way because everybody else is doing it, and then proceed to give them more logical reasons to keep them convinced just in case they begin to wonder about why they really did it.

Writing

Another medium for communication is the written statement. This medium is not as replete with psychological implications as is public speaking with its personal interaction between individuals. The whole thing is somewhat secondhand. Nor is the present discussion concerned with English Composition, but with a few psychological factors which may be employed by writers. Some aspects of this topic might be pertinent in the discussion of factors in life enjoyment. However, it is included in the present context where the emphasis is on how the writer may perform his function successfully.

Reason for appeal. One question is why readers like a particular piece of written material. A psychological mechanism which promotes liking for a piece of literature is the tendency for the reader to project himself into it. This may involve some vicarious wish fulfillment. If the characters in the story do something that is unattainable but desirable to him, the reader derives vicarious satisfaction from going through it with the characters or imagining that he is one of them.

Another type of appeal is the escape motive. Stories of places which are remote in time or geography get the reader away from here and now. When the present situation is unpleasant, reading about the Antarctic or the Middle Ages helps one to escape temporarily. Then there are certain topics which are sure-fire from the standpoint of eliciting interest of the average reader. Sex is one of these. Self-improvement is another. How-to-do-it is an intriguing motive for many readers, and the Whodunit type of writing is quite popular.

Control of attention. In writing, as in other media, there is the problem of controlling the attention. The initial bid for it may come through some of the well-known mechanisms such as asking a question, giving the inside story, or employing novelty and suspense. Suggestion may be effective here, and hinting at something without giving the answer immediately will maintain interest. Pictures in a book or magazine often stimulate attention. The popularity of the tabloids and the profusely illustrated magazines testify to the attention value of this particular device.

Precautions. A few points by way of caution. There is a danger of going over the heads of the readers. After all, the average American has a vocabulary of something like 9,000 words. This does not give the author too much leeway if he hopes to sell the book to *hoi polloi.* Undue repetition becomes monotonous and uninteresting and should be avoided. Phonetic harshness is undesirable. Although the average person does not read aloud, many readers employ auditory imagery.

Drama

Its appeal. Interest in drama is influenced by the same mechanisms just mentioned in connection with writing. The observer may project and identify himself with the characters on the stage. If the play deals with some more remote place or time, the escape mechanism is involved. Occasionally, more intellectual interest arises when the drama works out some social problem.

Mechanisms of attention. The situation at a play is favorable to control of attention, with the auditorium dark and the stage light. Other mechanisms mentioned elsewhere such as curiosity, suspense, and suggestion may be employed.

Social aspects. Mention should be made again of the unfortunate suggestion of crime or misbehavior which sometimes is involved in the drama. In the old melodrama the villain was cordially disliked by the audience, and there was little tendency to imitate him. The modern villain, however, is often smart and has a good time while it lasts, which may serve as a bad example for some of the audience.

Moving Pictures

The same unfortunate aspects just mentioned in connection with the drama pertain to the moving pictures. These were discussed in some detail in an earlier chapter (page 382). Special mention may be made of a few moving picture techniques which utilize psychological principles. It is possible to show clearly the imagery experienced by a character. He lies down to sleep, and his dream is wiped in on a corner of the screen. The close-up controls the focus of attention when it is desirable to direct the audience's attention to some particular item.

Radio

Production problems. Reasons for popularity of radio were discussed in connection with advertising media. A few psychological factors which are involved in production may be mentioned. When actors who have been successful on the stage move to the radio, it often is difficult to make the initial adjustment in getting them to stay put. Moreover, they have been relying on facial expression and gestures whereas in radio they have the voice alone. Television, of course, will remedy this. A studio audience is often helpful as a check on how the program is being accepted. It helps timing, for example, waiting for a laugh on the assumption that the listeners outside will spend about the same period laughing as do those in the studio. Sound effects derive much of their effectiveness from the arousal of imagery.

Education. The contribution of radio to musical appreciation was mentioned elsewhere. After all, one way to develop appreciation is to expose the person to the music. Radio does just that. Naturally it all depends on what kind of music is broadcast. Radio also has other educational aspects. Certain programs are arranged specifically for the schools and are often supplemented by printed material and manuals. In the field of adult education there are such informative radio discussions as book reviews, current events, news comments, and forums. Some stations, usually connected with educational institutions, put on courses for adults and even broadcast directly from the classrooms. With our increasing amount of leisure this aspect of radio education looms larger.

Politics. Radio now plays a major role in politics. An important factor from the psychological standpoint is that the whole electorate is much better informed than it could be otherwise. It is possible now for the majority of the people in the country to hear the presidential candidate. This puts a considerable premium on his radio personality. Other aspects of politics will be discussed later.

The Press

One other medium for communication and influencing people is the press. There is not much to add to what has been mentioned elsewhere. The relation of newspaper accounts to criminal behavior was discussed in connection with crime prevention, and the attention value of headlines was mentioned in connection with advertising. Cartoons are a unique feature of the newspaper. The picture itself has high attention value, and any point can be emphasized or exaggerated by the art work. Some noted politicians have expressed a profound fear of the cartoon attack. Another feature of interest is the ubiquitous comic strip. It often embodies considerable suggestion or even propaganda in the remarks made by the characters in the strip. Grocery stores report increased sales of cabbage on the day after one of the characters in the funnies has had an orgy with corned beef and cabbage. The role of the press in public opinion is evidenced by the efforts of vested interests to secure control of newspapers.

Public Opinion

Introduction. The third division of these outlying fields for applied psychology deals with social progress. The development of a society, of course, is shot through with psychological aspects, but the present discussion will single out only a few of the more obvious. One of these is public opinion. In earlier times opinions were fairly individual and fortuitous, but with present-day media for communication these opinions spread very widely. As public opinion began to take on more importance as a necessary prerequisite to major projects such as a war, leaders and other interested parties began to be concerned with deliberately influencing such opinion. Without appropriate publicity it is difficult for general opinion to develop. Few people know anything about the other two men who accompanied Paul Revere on his historic ride because nobody wrote a poem about them. Effort to influence public opinion is sometimes termed propaganda and sometimes education. The difference hinges largely on whether the person using the term agrees or disagrees with the objective.

Measurement. There are two principal methods of measuring public opinion—attitude scales and interviews. The former were discussed in connection with industrial morale (page 615). Identical techniques can be used to construct the scales and derive scale values. The subject may check items with which he agrees such as: "All Communists should be deported," or he may check his degree of agreement. The sum of the scale values of the items checked by a subject indicates his attitude regarding the matter under investigation.

The interview method for investigating public opinion is similar to procedures used to determine attitudes toward commercial products (page 653). Certain agencies conduct public opinion polls periodically. Their initial efforts were directed toward the prediction of elections, but now they include social issues and international problems. Even the government does some polling. As mentioned in the discussion of commercial interviews, there are sources of error such as the untrained or biased interviewer giving suggestions unwittingly, failure to secure adequate rapport, and comparative social status of interviewer and respondent.

Suggestion. The psychologist is interested in some of the mechanisms which operate in influencing public opinion. Paramount among these is suggestion. This is the mechanism which involves building up an idea while keeping out competing ideas. If a certain idea is planted, and all media are controlled so that they cannot publicize any contradictory ideas, the suggestion is effective. That is one reason for censorship in wartime. In some European countries listening to broadcasts from other countries was "verboten" lest the populace get countersuggestions from outside.

Indirect suggestion is less apt to arouse opposition than is direct. Euphemisms are an instance. Calling a residential district "substandard" rather than "slum" suggests that it is not so bad. Suggestion may be disguised as news. Some new dresses are brought from an European manufacturer by plane, and the air transportation is the news, but the suggestion is "new dresses from Europe." The whispering campaign is an insidious type of indirect suggestion. Persons have been hired to operate in teams—riding the elevators in the office buildings and conversing about some particular item. Prolonged applause after a speech or the introduction of an individual gives the impression that he is very important—witness the demonstrations after nominating speeches in a political convention.

There are numerous experiments which demonstrate how suggestion may operate in changing the attitudes of a group. Editorials were planted in a college paper regarding a foreign ambassador, some of them favorable and some the reverse. Students were required to read this paper ostensibly as part of an experiment on the psychology of reading. They were given attitude scales before and after, with items about the ambassador buried among other items. Most of the students who participated were influenced by the planted editorials.[8] At the time that the Japanese went into Manchuria some 700 college students filled out a scale on attitudes toward the Japanese. Two weeks later some of them were given a pro-Japanese talk by an instructor, others received a pro-Chinese talk, and still others had neither. After the talks they marked the scales again. The initial average score on the scale was about 50 points. On the second occasion the attitude toward the Japanese showed an average improvement of 1.8 points in the control group; with the pro-Japanese propaganda it went up 6.9 points; and with the pro-Chinese propaganda it dropped 6.8 points.[9] Some children were given a scale dealing with attitudes toward the Chinese. Then they were given free tickets to a moving picture that was favorable to the Chinese people and after seeing the film took the attitude scale again. The average score changed from 6.7 to 5.5, in a direction favorable toward the Chinese. The difference was clearly significant with a critical ratio of 17.5.[10]

Another source of suggestion is knowledge of the opinion of the majority. This was brought out in a study mentioned previously (page 308), in which persons filled out an attitude scale a second time, after being told how the majority had marked each item. There were appreciable changes as a result of this suggestion. But there were also changes of a lesser degree when the subjects were told how a group of experts had marked these items. This inferiority of expert to majority suggestion seems unfortunate because generally experts know more about a subject than the majority. Nevertheless, expert opinion does carry some prestige. For example, a test was given to college students covering various opinions on socio-economic questions. A few weeks later the same test was given, but each item was attributed to some prominent person. Analyzing the changes of opinion revealed that certain prominent people had a good deal of prestige value. With one sample of students the statements which were attributed to the then president of the United States received a higher rating than they had previously, whereas those attributed to a former president went distinctly in the opposite direction. Evidently something depends on the expert cited.[11]

---

[8] Annis, A. D., and Meier, N. C., "Induction of Opinion Through Suggestion by Means of Planted Content," *Journal of Social Psychology*, 1934, 5, 65–81.

[9] Chen, W. K., "The Influence of Oral Propaganda Material Upon Students' Attitudes," *Archives of Psychology*, No. 150, 1933.

[10] Peterson, R. C. and Thurstone, L. L., *Motion Pictures and Social Attitudes in Children*. New York: Macmillan, 1933.

[11] Lurie, W., "Measurement of Prestige and Prestige-Suggestibility," *Journal of Social Psychology*, 1938, 9, 219–225.

This prestige suggestion sometimes is overdone as when George Washington is cited as favoring some institution that did not even exist in his time.

Atmosphere is one of the more subtle types of indirect suggestion. A bank building with its heavy looking architecture and bars on the windows give an impression of security, quite apart from the fact that a burglar could pick the lock on the door. A municipal civic center with large impressive buildings creates the idea of an important city. The dairy store with its white front suggests cleanliness. In the court the high bench tends to create an atmosphere of dignity.

Music often creates background because of association of certain songs with a particular context. Its contributions to religious, political, and nationalistic attitudes are mentioned elsewhere. Different regions have their own characteristic music which often carries some suggestion, for example, oriental music. It is possible likewise to suggest some definite era. There are even seasonal associations with music, such as the conventional Christmas songs or "Auld Lang Syne" at New Year's. Atmosphere thus carries a good deal in the way of indirect suggestion.

Set. Another psychological factor which affects public opinion is set. This is a dynamic adjustment of the individual which facilitates certain kinds of behavior. Posture is an instance. Kneeling in church or before a throne carries a certain attitude of submissiveness. The clenched fist salute facilitates a more militant set. Curiosity sometimes can be capitalized. If it is possible for a publisher to get a book banned in Boston, everyone wants to read it. There are occasions where an existing unfavorable set may be transferred to something which is related. The demagogue plays up something against which the people are already prejudiced and then identifies an opposing candidate with that something. Psychological warfare utilizes this same principle in attempting to discourage the enemy still more when they already are having trouble.

The individual's own background may condition his attitude to some extent. Some of this naturally develops in the home. Children of veterans have an attitude toward war different from that of other children. Economic status has an influence. Persons who are not very wealthy generally are more anxious to change the social order than persons who are well fixed and are inclined to be more conservative. Frustration may influence one's set. It often manifests itself in some type of aggression. The situation is complicated, however, by the individual's level of aspiration. A person is not aggressive because he is frustrated by the fact that he cannot jump to the top of a building, for he has no particular aspiration to do this. When he wants some luxuries which are unobtainable, however, he may aggressively do something about it.

Defense mechanism. Public attitudes are often attributable to some defense mechanism. It is like the individual who does not have much to say, but says it very loudly as a sort of defense. Dictators, dimly aware of some inferiority, resort to saber-rattling. The scapegoat offers possibilities of blaming one's shortcomings on somebody else. If a group is culturally and intellectually inferior to another, the members are liable to become belligerent as an outlet just as the dumb youngster in school becomes a bully.

Repetition. A device that often facilitates the development of public opinion is sheer repetition. Slogans derive much of their force from the fact that they are experienced time and again. "Making the world safe for democracy" or "a full dinner pail" were reiterated until they developed a backlog of opinion. Alliteration, rhyme, or any mnemonic device facilitates this process. If a symbol like a flag is seen repeatedly, the people are reminded of what it stands for. There was experimental evidence of the effect of repetition in the study of the effect of movies on children's attitudes. When they were shown two moving pictures dealing with the Chinese, their change of attitude was greater than when they were shown a single film.

Reasoning. The role of reasoning in public opinion, unfortunately, is not as great as might be desired. There is a closer relation between belief and desire than between belief and reason. There are occasions, however, when a more favorable attitude toward something may be developed on a rational basis. In one project a more favorable attitude toward certain races developed when more information was provided about them. On the other hand, a rational approach did not help in a project dealing with soil erosion. Evidently, it would be difficult to predict in advance in what situations a logical approach would be effective.

Stereotypes. A frequent mechanism that influences opinion is known as a stereotype. This is a sort of average conception of something—the gaunt tall-hatted reformer or the rotund cigar-akimbo politician. The cartoonists employ many such stereotypes. In an experiment where the subjects attempted to identify the occupation of persons shown in photographs, almost everyone spotted the bootlegger by his rough clothing and cap and the Russian reformer by his whiskers. Time was when physicians raised beards and lawyers carried briefcases because those items were universally associated with those professions.

Stereotypes exist also in connection with words. American opera singers used to adopt a foreign sounding name, because the public thought that foreign singers were better. Scare words like Fascism or Communism influence attitudes. This principle has been demonstrated in an experiment in which the subjects express their judgments on various statements in the social or political fields. Then, on another occasion they react to those same statements which are now labeled, "Fascistic," "Pacificistic," "Radical," "Communistic," and so forth, and the changes in attitude are noted. In one such study the changes in the expected direction denoted as a per cent of the maximum possible change were as follows: Fascism, 27 per cent, Pacifism, 8 per cent, Radicalism, 32 per cent, Communism, 28 per cent. It is obvious that merely labeling a proposition with a stereotyped word influenced attitudes toward the proposition.[12]

Emotions. The ineffectiveness of reasoning as contrasted with desire or emotion in influencing belief was noted in another experiment in which a group of college students was presented with logical arguments in favor of an isolation foreign policy while another group heard emotional arguments on the same point. Two other groups likewise heard logical and emotional presentations in favor of collective security. Attitude scales were administered before and after the speeches. It developed that those who were subjected to the logical argument showed little change, whereas those who heard the emotional discussion changed considerably in the direction of the advocated policies.[13]

Another experiment under practical conditions pointed in the same direction. It was conducted in connection with a political campaign in one of the Eastern cities. Leaflets were distributed in one ward of the city, urging support of the Socialistic ticket and centering on an emotional appeal such as is often used in political advertising. In another ward, leaflets were distributed urging this same vote on a rational basis. A third ward was studied but no leaflets were distributed at all. The data involved the increase in the Socialist vote over that of the preceding year. In the district with the emotional leaflet the change was 60 per cent, with the logical leaflet it was 35 per cent, and in the control district, 24 per cent.[14] A radio network refused to let politicians who hired the facilities of the stations dramatize their presentation, on the ground that it "threw it to the emotional side." The point was well made.

Some specific emotions may be mentioned in this connection. Sympathy is an old stand-by—the under-dog, the widows, and orphans. The charity drive pictures a badly worn pair of shoes, "the other fellow's shoes." When a well-known financier was on trial for embezzlement, publicity was given to the fact that he could not even afford a taxi to come to his own trial but had to take a streetcar—an obvious play for sympathy. Fear is another frequent emotion in this connection. Fear of accidents has been used in safety campaigns. Financial fears cause disturbances in speculative investments and even produce a run on a bank. Anger often influences public opinion. Atrocity stories may be fabricated in wartime to arouse hatred of the enemy. The famous picture of a Chinese infant sitting crying in the ruins of the bombed Shanghai railroad station nearly started the war long before Pearl Harbor. There is also the possibility of expanding the feelings and emotions aroused by a few members of a group to include the whole organization. If one person of a certain nationality or other group commits a gruesome murder, the public uncritically imputes his characteristics to the entire group of which he is a member. The music or the literature of a few artists or writers of a country may create favorable attitudes toward the whole country.

---

[12] Menefee, S. C., "The Effect of Stereotyped Words on Political Judgment," *American Sociological Review*, 1936, 1, 614–621.

[13] Menefee, S. C. and Granneberg, A. G., "Propaganda and Opinion on Foreign Policy," *Journal of Social Psychology*, 1940, 11, 393–404.

[14] Hartman, G. W., "A Field Experiment on the Comparative Effectiveness of Emotional and Political Leaflets in Determining Election Returns," *Journal of Abnormal and Social Psychology*, 1936, 31, 99–114.

Morale. One of the obvious manifestations of public opinion is morale. It is influenced somewhat by the immediate environment. A well-fed person in a congenial home has better morale than one who is on the ragged edge of subsistence. There have been instances of appreciable correlation of morale with crops in the agricultural districts. Various measures looking toward security will improve morale. Another thing that improves the morale of the individual and which may spread to the larger group is adequate vocational adjustment. Avocations likewise help, for people who are engaged in interesting pursuits in their spare time generally are happier. Education for leisure has been mentioned as a desirable social project contributing to this end. Morale in some situations may be influenced by the mere matter of titles. The clerks were designated as associates in a large retail establishment and developed a more favorable attitude.

Education. When the educational system attempts to change attitudes, it tends to proceed along intellectual rather than emotional lines even though the former may not be as effective. In fact, the school sometimes makes efforts to teach pupils to resist the more emotional type of propaganda by showing them how it is done and thus perhaps making them more immune to it. The forum is helpful, because if the students can learn that there are two sides to most questions, they are less apt to accept one side uncritically as the result of some emotional appeal. There are many instances in which outside agencies attempt to use the educational system for their own propaganda. There have been efforts to remove from geography text books statements about hurricanes or earthquakes in some particular region lest they frighten away the tourists. The word oculist was changed to optometrist in one textbook. Visual aids are often supplied to the school system by some commercial concern. One of the fruit producers furnished home economics departments with free instruction material about preparing fruit which included some publicity for a particular brand. Another frequent device is the essay contest sponsored by some outside agency. It may have a patriotic or a safety motif, but it is intended to indoctrinate the pupils. Even children's games may spread some propaganda. For example, in one game where pieces were moved around as dice were thrown, there was a "Communist" zone which involved heavy penalties and was to be avoided.

Press and radio. It is natural that vested interests should attempt to use such widespread publicity media as press and radio in order to influence public opinion. Various aspects of these media have been discussed elsewhere, and only a few points need be mentioned here. Agencies sometimes supply propaganda disguised as news to the press, hoping it will be printed. A Health News Service, for example, was actually promoting the use of milk. A Fashion Work News Agency gave releases to the press about current styles, but actually was employed by a manufacturer of shirts. Letters to the editors are sometimes promoted deliberately by some vested interest. Occasionally, a large proportion of letters dealing with some particular issue is traced to a single office. One of the most direct efforts to influence opinion on the radio is the political speech. However, the radio stations attempt to be impartial in allowing equal facilities to all political agencies. Radio round tables or town meetings have considerable influence in clarifying some public issues and tend to throw the matter back to the intellectual side away from the emotional. News commentators doubtless inject some of their own opinions into the newscasts and influence some people in that way deliberately or otherwise. During an emergency, of course, the government takes care of propaganda on the radio.

Politics

The voter. Another field which contributes to social progress is politics. One important psychological consideration here is the voter himself. Perhaps he may be suggestible and influenced by media for suggestion. These include whispering campaigns, disguised news, slogans, or pictures of the candidate in a bucolic atmosphere wearing galusses. Another factor is the natural tendency to follow the herd, which is one reason why many persons enjoy parades or rallies. One is less apt to be rational in a crowd and is inclined to operate more on an emotional basis. Getting on the band wagon is an extension of this motive. A characteristic of many voters is their comparative ignorance of the issues, much of which results from lack of interest. From time to time some group is given experimentally a test of information on political matters, and the results usually are discouraging. The individual has feelings on the matter but is not very well informed. This situation may be changing a little, thanks to such institutions as the radio forum.

The party. Another question of some psychological interest is why the voter belongs to a particular party. People do not change their party affiliations very often once the habit is formed. Naturally, one source of such affiliation is the home. In one sample 71 per cent of the voters had the same party affiliations as their fathers. Some of this, of course, reflects other factors such as location. Some states are traditionally in a certain party, and a youngster would affiliate with the party on a general cultural basis as well as on a home basis. This geographical factor may be seen in the fact that there often is a greater difference in the vote of two adjacent counties that lie across a state line, than between two adjacent counties lying in the same state.[15] Results as to age, sex, and vocation are less clear.

The politician. A central element in politics is the politician himself and the psychologist is interested in why people follow that particular career. Some apparently are interested in a sincere effort to help humanity. Others seem to like the game and enjoy the gamble of a situation which involves some elements of uncertainty. Still others seek the prestige that goes with public office and enjoy being in the limelight.

Some efforts have been made to survey the characteristics of the successful politician. Most of them possess considerable social intelligence which apparently is necessary in the process of getting elected. Leadership seems to be another frequent characteristic. Persistence is found quite generally because the politician inevitably gets rebuffed. Studies have been made on the occupations from which the politician most frequently springs. The legal profession is one of the most common, but the causal relationship is not clear. Many of those without legal training may have been unsuccessful and dropped out of politics, or the same kind of person may have been attracted to both fields, or perhaps some may have had the political objective since college days and deliberately taken legal training as a preparation for it.

---

[15] For a number of observations in this connection of party affiliation see Rice, S. A., *Quantitative Methods in Politics.* New York: Knopf, 1928.

The campaign involves some psychological features similar to those discussed in connection with advertising. An initial problem is directing attention to the candidate. Posters, radio mention, newsreels, and paid advertisements contribute. Perhaps the candidate can secure publicity in connection with some public event such as giving a dedication speech. The political convention highlights the candidate, and the lowly campaign buttons have a cumulative effect.

A second aspect of the campaign is making the voters remember the candidate or some particular selling point regarding him. That is where slogans come into their own. Comparatively few people read the platform, but they can remember a short slogan, especially if it involves rhyme or alliteration. The campaign songs serve as a reminder of the candidate and embody some implicit selling point.

A third consideration in the campaign is the actual appeal used to sell the candidate. This sometimes takes the form of a logical appeal centering, perhaps, around actual issues. On the other hand emotion often is more effective than reason. The opposition may be quite successful in deprecating the candidate's ancestry, his religion, or his character. Cartoons often put their finger on a real or imagined weak spot, and some insinuations are so bad that they are not even committed to print but whispered around. The personal touch helps in many instances. The voter who has seen a particular candidate, or better still, shaken hands with him, is duly impressed. This personal element is greatly implemented by radio, in which most of the voters can hear the candidate. Television will make it possible for many of them to see him also. The band wagon effect and its demonstration in experiments where judgments were influenced by knowledge of majority opinion have been mentioned elsewhere. There was considerable worry at one time that the public opinion polls, when they were publicized prior to an election, would lead many persons to change their vote in the direction of the majority, regardless of their own convictions. There have even been proposals to forbid publication of results of opinion polls prior to elections. It appears empirically, however, that this concern is not well-founded. In 1932 the Literary Digest, which had been very successful in predicting several previous elections on the basis of their public opinion poll, came out with "Landon by a landslide." Shortly after this pronouncement, the opposing candidate was elected. Evidently the prediction that Landon would win did not swing enough voters to that band wagon to do the trick. Other investigations on a smaller scale have had similar results.[16]

---

[16] See Katz, D. and Cantril, H., "Public Opinion Polls," *Sociometry*, 1937, 1, 155–179.

Religion

Psychological factors in religion. The applied psychologist has some modest contributions to make in the field of religion. He is not concerned, of course, with its value as an institution, nor with theology and religious doctrines. His interest is in the behavior of a person experiencing religion and in controlling such behavior. To this end it is necessary to know something about the nature and origin of religious attitudes.

Emotion plays quite a role in religious experience. This is most obvious, perhaps, at the time of conversion, which seems to be characterized by feelings of inadequacy, depression, and conflict, followed by exaltation. This phenomenon is most frequent at adolescence. In three samples the median age at conversion was fourteen years eleven months, fourteen years seven months, and sixteen years seven months.[17] This age trend probably is related to the increased emotional tensions of adolescence cited elsewhere (page 682). Another indication of the emotional element is the way that religious attitudes come out in times of stress.

Although the emotional aspects are prominent, it should be noted also that religious attitudes are modifiable. This fact is implicit in the term "religious education," and youngsters are trained to follow particular religious patterns. Methods range from home observance or Sunday School up to strenuous efforts at indoctrination. This procedure does not always "take," but in a large proportion of cases, if the efforts are systematic, some modification takes place. Religion lays considerable stress upon belief. Pertinent in this connection is the closer relation between belief and desire than between belief and evidence. Thus, it is natural for many religious beliefs to be along lines which people would desire, such as a pleasant hereafter.

Some less frequent motives in religion may be mentioned. In some instances it has a definite escape aspect. Persons whose present lives are unhappy escape by contemplating some future state which will be the opposite. There also is a momentary escape from undue excitement and worry by dropping in to a quiet church for contemplation. The psychoanalysts make something of regression mechanisms in religious experience. In a study of a large sample of hymns about a third were found to express thoughts and desires suggesting return to childhood or infancy—for example: "Everlasting Arms"; "Let Me to Thy Bosom Fly"; "He Leadeth Me." Many people occasionally have a nostalgia for childhood and its corresponding irresponsibility, and perhaps there is a trace of this in their religion.

---

[17] Conklin, E. S., *Psychology of Religious Adjustment*, page 109. New York: Macmillan, 1929.

Influencing religious attitudes and emotions. The psychologist interested in controlling religious behavior must concern himself with emotions. Just as one becomes more angry when he clenches his fists, so going through motions connected with worship brings out the emotions which normally accompany it. Kneeling, prostrating oneself, or even kissing some symbol produce a submissive attitude so that the individual is more receptive to other aspects of the situation. The atmosphere of the place of worship also contributes partly through the mechanism of suggestion. The dim light promotes a quiet, relaxed, receptive attitude, and the high ceiling makes the worshiper somewhat small by contrast. The organ music and the hymns, by virtue of the tempo or the meaning of the words, get the congregation set for other features of the service. In some revivals, to be sure, the tempo is altogether different, but the psychological principles are the same. Even the high pulpit promotes suggestibility much as the hypnotist has the patient fixate some point above the line of vision with resulting ocular fatigue. Prayer involves an element of auto-suggestion. Simply repeating something that one desires does tend to build up that idea, and, if it is something which is partly within the individual's own control, the auto-suggestion may be effective. Many will remember the therapeutic system originated by Coué which involved repeating over and over, "Every day in every way I am getting better and better and better." Prayer often involves considerable repetition and some religions implement this with a prayer wheel or something similar which insures that the idea is repeated. This technique is scientifically sound enough from the standpoint of auto-suggestion, provided that it is limited to things which are somewhat within the individual's control. Auto-suggestion cannot affect the behavior of another person. Another situation which may involve considerable suggestion is the revival where vigorous religious activity is obvious to the individual, and there is also an element of social facilitation.

If the church is concerned with the development of attitudes like altruism, it is well to note how attitudes may be influenced by participating in something related to an objective. It will help to develop altruistic attitudes on the part of youngsters if they can be induced to participate in work related to an altruistic goal. Perhaps they collect old newspapers for charitable purposes, and although they derive the initial pleasure from the mere excitement of going around and ringing doorbells, they presently develop interest in the altruistic objective through the mechanism of emotional transfer.

Therapy. One other aspect of religion which interests the psychologist is psychotherapy. There are many instances in which persons have been "cured" in a religious setting. It will be recalled from the earlier discussion of psychotherapy that suggestion plays quite a role. There have been instances of hysterical paralysis in which some powerful suggestion, such as an emergency, or some tremendous emotional urge was sufficient to break through the hysteria so that the patient was able to move. Religion may constitute such an emotional experience. A location where other persons are supposed to have been cured of ailments is heavily loaded with suggestion. Scientifically, however, this type of therapy can be considered successful only for cases which are definitely psychological in origin. Hysterical paralysis, or mutism, or hypochondria might yield to it. It also should be emphasized that such therapy should not be attempted unless it is certain that there is no medical aspect of the case which needs attention. Persons have died from an organic disease while some religious practitioner was administering suggestive therapeutics.

In another type of therapy there are cases where the best possible treatment is for the patient to discuss the difficulties with a sympathetic listener and simply get the whole thing out of his system. This technically is catharsis and may take the form of nondirective therapy. Thus, talking the thing through with some religious agent or confessing has definite therapeutic value. Here, again, it should be ascertained at the outset that there is no organic involvement.

The foregoing discussion is not intended to reflect upon the other aspects of religion as an institution in our culture, but like any other institution, it may have some use for applied psychology. Granted that it is desirable to produce religious attitudes or cure minor disorders, applied psychologists can point out some techniques that may be useful.

War

Psychological factors. Applied psychology now plays a considerable role in war. This role could be discussed at great length but will not be in the present context for two reasons: it is hoped that the psychologists will not have to apply themselves to another war in our time; some things that might be of value to a potential enemy are better left unsaid. It may be interesting to explore the psychological factors involved in the causation of war. There is apparently no instinctive basis for organized fighting. The individual does have, however, a fundamental tendency, often called the instinct of self-preservation, which leads him to fight back when individually attacked. Animals fight for food or mates. Civilization has spread a thin veneer over this primitive tendency, and at least we "get" the other person with more finesse, but there are occasions when a comparatively slight stimulus breaks through the veneer, and a brawl results. This type of behavior may spread to a larger group in much the way that fear spreads in a crowd and develops into a panic. If a lot of people become irritated about some other country, talk belligerently, and make threats, each individual influences the others and the attitudes and emotions are accentuated. With increasing hate of an enemy or fear of an invasion, the social-psychological factors come into play and channel some of the more primitive, individualistic tendencies into a group effort. When public opinion has reached that point, the Congress declares war, although some countries do not bother with the formality.

Another psychological consideration is why an individual engages in a military project voluntarily once it is under way. One factor may be suggestion from the bands, the cheering, the flag, and such manifestations. The hate motive influences some people as a result of atrocity stories. Many men enlisted right after Pearl Harbor because they were "mad." Some join out of a spirit of adventure. Some take a long-time but rather self-centered view. For example, the writer knows some law students who enlisted advisedly because they planned ultimately to go into politics and felt that they would stand a much better chance of election if they were veterans. Another motive is desire for social approval. Again, it may be a matter of escape from some annoying situation: there have been men who joined up just to get away from an over-large family. Some men, on the other hand, experience a severe conflict between the desire to enlist and duty to the family. If they are drafted, the decision is made for them, and the conflict disappears.

When a man reaches the front, the reasons for his fighting may be different from the reasons for his enlisting. If there is good morale in his outfit, he fights out of loyalty to the others so as not to let them down. Again, he may do it because of good leadership. Some of this is a matter of imitation, such as following an officer who goes into a dangerous position with some assurance. With others it may become almost habitual and is a question not so much why as how.

Selection and classification of personnel. A major field for actual psychological techniques is the selection and classification of military personnel. The problem is analogous to that of selecting industrial employees. There are the general classification tests that serve to locate the soldier at his approximate intellectual level and help in his assignment. Special aptitude tests are available for such personnel as bombardiers, pilots, and navigators. Trade tests have wide applicability. Job families relate military specialties to civilian occupations. Special procedures may be developed for selecting officers. A clinical psychology approach may detect those who will crack up under combat conditions.

Training. Another field for military psychology is training. The basic principles of learning are applicable here. Many of the teaching aids used in the school systems may be adapted to the military instruction. It is possible to arrange complicated training devices under laboratory conditions that subject the soldier to almost the same stimuli which he would have in actual combat. The motivational aspects of learning are quite favorable in wartime, especially if the individual sees the relation of his job to the whole project or how it may actually save his own life. For instance, men practice under a screen of live ammunition when they are learning to crawl close to the ground. This also accustoms them to dangerous situations. Overlearning may be very important. A soldier who has overlearned the manipulation of assembling a machine gun can do it under fire if necessary. Another question in connection with military training is how long a particular skill, like flexible gunnery, will persist. The time elapsing between training and actual fighting may be too long.

Two aspects of training deserve special mention. One is general training in the distribution of the attention. A soldier who is not accustomed to the many distracting stimuli present in combat may attend to the wrong thing—for example, be distracted by the dive bomber when he really should be watching the approaching tank. Training under realistic conditions with similar distractions contributes here. Another special type of training was that given for recognition of aircraft and surface vessels. The program consisted essentially of flashing pictures of craft for a fraction of a second, according to a carefully worked out schedule.

Morale. Military morale problems are similar to those in industry (*cf.* Chapter 21). One factor that contributes to military morale is mere physical fitness. Adequate food and sleep do likewise. Pride in one's particular unit may be a factor and often is implemented by some suggestive name and an appropriate shoulder patch. Martial music has an obvious function in this connection. Marching with the band promotes a certain *esprit de corps* and makes for a more unified military group. In 1918 at the height of the influenza epidemic, morale went very low in one of the camps, but was improved considerably by having a parade with the band every day. Community singing during wartime helps build the civilian population into a more unified group.

Fear may have a pronounced negative effect on morale and it is often aggravated when soldiers are idle. That is where the recreational and educational programs come in. In anger or rage there is a physical efficiency which results from increased adrenalin, but also the emotional response has a more disorganized character.

Leadership is of obvious importance in military projects. This points directly to problems of selection and training of commissioned personnel. Officer classification tests have been mentioned already. Training programs include some of the psychological factors involved in handling and motivating men—rather like the content of the foreman-training program. Some of the characteristics that enlisted men think should characterize good leaders were ascertained incidentally in interviews with thousands of soldiers. Among such characteristics were the following: ability or general competence, interest in the welfare of the individual soldier, promptness in making decisions, being a good teacher or instructor, showing judgment and common sense, not bossing the soldier around when there is no good reason for it, telling the man when he has done a good job, and, finally, impartiality.

Perceptual problems. There are a number of problems in the field of perception that have military significance. Individual differences in visual or auditory acuity or in color vision are of obvious importance and can be measured. Acuity also depends on adaptation. Some officers follow a practice, which is perfectly sound, of covering one eye with their hand when they go from the bridge to the chart room so as to keep it dark adapted while they are looking at charts under higher illumination. After-images interfere with effectiveness of vision. If a person looks at the sun or a nearby gun flash, he is bothered by black or light spots for some time. He should certainly avoid watching the flash of his own gun. Another factor which makes for visibility is shadows. Low hills and shell holes cast much longer shadows near sunset or sunrise and, hence, are more visible at such times. There are various technical supplements to perception—for instance, red glasses are used to detect camouflage because green paint reflects a small amount of red light whereas green grass does not.

Psychological warfare. An appreciable contribution to the total effort may be made by deliberately influencing the attitudes of the enemy. The problems are analogous to those of public opinion discussed earlier. Media include leaflets dropped from planes or shot by special artillery, radio broadcasts of programs with propaganda interspersed to which the troops or the civilians will want to listen, and occasionally huge amplifiers that make it possible to talk to the enemy at an appreciable distance. Such media are often used to undermine the confidence of the enemy in their leaders or to show that their cause is hopeless. Uncertainties may be stressed such as forthcoming secret weapons. If such propaganda is heard when the enemy is hungry or sick, it will be all the more effective. Once they are somewhat disillusioned and despairing, it is possible to suggest giving up as the best way out. One broadcast, for example, described the rations which were given to prisoners. The leaflets dropped actually included tickets which one could use if one wished to surrender and, presumably, get the better rations. At this point, if the enemy can be led to fix the blame on their leaders and thus save their own faces, they may be persuaded to give up as a result of this rationalization.

Demobilization. The psychologists have one further stake in a war, namely, facilitating demobilization and the readjustment of military personnel back into civilian life. This involves two possible aspects—vocational adjustment and mental hygiene. The former embodies the basic principles of vocational guidance outlined in an earlier chapter. Job families with the military specialty as the base job, interest and aptitude tests, and information about vocational opportunities may help in advising the soldier on vocational objectives. Similarly, those who have experienced some mental trauma, or who have changed somewhat, or whose home environment has changed during their military service may profit from some counsel.[18]

Psychology and Peace

Aggressiveness. A final outlying field to which psychology may make some contribution is the promotion of peace. Man is naturally aggressive and has not proceeded very far from the Stone Age, but a social group is not necessarily and inevitably warlike. Discordant groups often can be united against a common enemy. There are plenty of historical instances where two groups were fighting each other much of the time, but when a common enemy came across the border, they immediately united against him. It is probable that if there was an invasion from Mars, most of the world would get together for a common defense. It is unfortunate that it is easier to unite people *against* something than *for* something. There have been suggestions that we might attempt to get larger groups to unite against some enemy, which is not another group of people, but something that they would all like to avoid. Fighting disease or some other type of disaster in a large way would be an example. However, this fundamental aggressiveness is more realistic in a situation against other people. Another possibility is to give this tendency other outlets than actual combat, actually some type of sublimation.

---

[18] For a brief discussion of the psychological aspects of war, prepared as a handbook for military personnel by a Committee of the National Research Council, see "Psychology for the Fighting Man," *The Infantry Journal,* 1943.

Organized athletics has been suggested as one such outlet. One can manifest aggressiveness in a competitive situation without reaching the point of killing the other team. International games such as the Olympics hold some possibilities.

Superiority and inferiority. Basically, most people are quite egocentric. The self-preservation tendency often leads a person to overestimate his own superiority because of this self-interest. If he is superior, someone else must be inferior, and it is common practice to look down upon other groups or even nations as an extension of this attitude. If this attitude becomes obvious to the other parties they are apt to get frustrated and perhaps do something to achieve status. This may eventually lead to open conflict. About the only thing the psychologist can suggest is to offset the tendency to regard the other persons as inferior by education—showing ways in which others are not so inferior, after all. This may take the form of promoting a greater cultural appreciation of other peoples by calling attention to their music, literature, and art. It may also help to point out similarities between the superior and inferior groups, and to emphasize these similarities rather than the differences.

Frustration. If groups of people or nations find their conditions of life very disagreeable, or if there is a marked discrepancy between what they want to do and what they are able to do, frustration tends to make them willing to try anything that conceivably could ameliorate conditions. Thus, they are quite open to suggestion and might even be induced to try war as a solution. Politicians and dictators are well aware of this. An obvious remedy is to ameliorate the conditions which are causing the unrest. Another possibility is to give the people other outlets and interesting things to do. One can often escape by reading about something that is remote, or by avocational pursuits, or by recreation. If everyone played a little more, there might be better interpersonal and international relations. Another profitable technique could be to study the aspirations of any people who seem to be potential troublemakers and find out what they really want. The technique of public opinion polls may be used to tap this information. Once the aspirations are known, and, particularly, if some conflict is apparent between aspiration and achievement, something may be done about it. Such problems are quite analogous to the individual mental adjustment problems discussed earlier. It will be recalled that a frequent technique with maladjusted school children who feel inferior is to give them success experiences. The same method may be applied to much larger units.

Educational efforts. Education can serve as a remedy for a great many things if it is properly organized, and there is no reason why it could not make some contribution to the problem of getting people to the point where they realize that war is unprofitable and their difficulties may be resolved by other means. It presumably is more profitable to concentrate educational efforts on the younger generation where there are fewer thoroughly ingrained habits and prejudices with which to contend. It is much harder to break attitudes and habits in the older generation. With them the approach may be to interest them in better opportunities for their children. The effectiveness of education on youngsters in Germany and Italy during the years preceding the second war was terrific. There is no reason that similar techniques could not be used to inculcate a broader point of view. However, efforts of this sort in one country, while other countries do just the opposite, would not go very far toward preventing international complications. It is most important to make such efforts with countries that are the most apt to run amuck.

Cooperative attitude. There are some possibilities of developing a cooperative attitude between groups that might otherwise come into conflict. If people get together personally, discuss problems of common interest, and see each other's points of view, they often come to a better understanding. A good analogy is the factory committee which is found in some industrial organizations where executives, foremen, and workers gather together around a table and discuss problems of mutual interest. Something on this order may be arranged on an international basis. Language constitutes a severe handicap in many instances and makes the meeting more formal, but by just coming to understand individuals, one may develop a little different attitude toward the country from which those individuals come. It may be necessary for a while to hold down forcibly some uncooperative groups while the others are developing a better understanding through these procedures. Meanwhile, a new generation may come along in the uncooperative groups and can be made to see that after all crime does not pay.

A final caution regarding the suggestions in the present section is that any effort of this sort must be worldwide or at least include all the units that would be strong enough to make any appreciable trouble. If a few groups with high purpose attempt to prevent war and indulge in wishful thinking that others will do likewise, some real belligerent may take advantage of them to their disaster. Psychology has no panacea for war, but giving certain instinctive tendencies that are potentially dangerous more salutary outlets and attempting to modify attitudes by educational programs and participation in joint deliberation carry some promise, provided that they are done on a worldwide basis.

Summary

Although the major contributions of applied psychology have been in the fields of education, medicine, law, and business, there are some outlying fields where much less empirical work has been done, which are worth mentioning. One subdivision of these deals with life enjoyment. Psychological factors contributing to the enjoyment of art include empathy, psychic distance, and association of the object with pleasant experiences. Appreciation of painting and music may be developed by exposing the individual to them and by the individual's imitation of others' enthusiasm. Musical aptitude can be measured by appropriate tests. Enjoyment of poetry comes from the mere combination of sounds, from rhythm, and from the meaning of the words.

Athletics has been studied more in detail than other forms of recreation. Aptitude for athletics may be measured by psychological tests. Perceptual factors such as ability to discriminate in peripheral vision and judgment of distances may be important. The usual laws of learning are applicable to athletic training, and special training is profitable in the fields of perception and attention.

A second major division of the outlying fields of applied psychology deals with communication and influencing people. The public speaker's task may be facilitated by the architecture of the hall, or the illumination, or even the way the audience is seated. Initial attention may be secured by the usual devices such as intensity or curiosity. Keeping the attention may be facilitated by establishing rapport and by audience participation in ritual or song. Suggestion is a frequent means of appealing to the audience or persuading them. Belief may be created more easily by means of emotion than by reasoning.

Literature derives some of its appeal from the tendency of the reader to project himself into the situation, and from the escape which it affords. Special devices to control attention are desirable. The writer should be careful not to go over the heads of the readers in the matter of vocabulary. Similar mechanisms operate with the drama. The control of attention is facilitated by the darkened auditorium and the light stage. The drama sometimes carries unfortunate suggestions of crime and misbehavior without the appropriate negative suggestion to the effect that this type of thing does not pay. It is much the same story with moving pictures. Movies have additional psychological features such as the ease with which a character's imagery can be portrayed by wiping it in on the scene and the close-up which is analogous to the focus of attention.

Radio production involves some psychological problems such as adapting an ordinary actor to the radio situation. A studio audience helps adjust the program to the radio audience. The press carries few psychological implications beyond those already mentioned. Cartoons, however, are a unique feature in which it is possible to emphasize certain points through the medium of suggestion. The funnies too may indirectly involve considerable propaganda.

A final subdivision of the outlying fields of applied psychology deals with social progress. Public opinion has recently assumed considerable importance in such progress. It may be measured by attitude scales or by polls. One of the major elements influencing public opinion is suggestion. Indirect suggestion arouses less opposition than direct. The idea may be planted by suggestive terminology, by disguised news items, and by whispering campaigns. Negative suggestion may be effective at times. Experiments with attitude scales administered before and after being exposed to editorials or moving pictures have shown clear evidence of changes in attitude.

Another major factor influencing public opinion is set. This may take the form of physical actions appropriate to the situation. Public opinion may be influenced by the home situation, by economic status, or by inability to reach one's level of aspiration. Defense mechanisms play a role as in the dictator's saber-rattling. Repetition serves to emphasize a bit of propaganda. Stereotypes carry considerable weight. Experiments in the political field indicated that leaflets distributed in a voting district had more influence when the appeal was emotional than when it was rational. Effective emotions in this connection are sympathy, fear, and anger. If these emotions are directed initially toward an individual, they may be transferred to the entire group to which that individual belongs. Morale may influence public opinion, particularly as it reflects economic security. Vocational adjustment is helpful. The educational system contributes to an intelligent public opinion by showing the pupils that many issues have two sides and by developing a critical attitude.

In the political field the voter is influenced by the various mechanisms just mentioned in connection with public opinion. Party affiliation seems to be, to quite an extent, a matter of home influence. Persons become politicians for a variety of reasons—interest in helping humanity, prestige, publicity, or the mere gamble of the situation.

A political campaign involves considerable psychology in the way of selling mechanisms. Attention must be directed to the candidate by posters, radio, newsreels, paid advertising, political conventions, and campaign buttons. Slogans are often successful in impressing a particular item. The personal touch is helpful. Although there is some tendency to get on the band wagon, statistics suggest that publication of opinion polls does not seriously influence the voters in the direction of the published majority.

Among the factors contributing to religious behavior emotion looms large. Numerous conversions take place during the period of emotional tension in adolescence. Other motives include escape from present unhappy situations by contemplation and even regression toward childhood attitudes. If one is interested in influencing religious emotions, the well-known relation between emotion and bodily response is pertinent. The atmosphere of the place of worship is often conducive to an emotional attitude and increases suggestibility. Prayer involves an element of autosuggestion. The church sometimes contributes something in the way of psychotherapy, but such procedure should not be attempted if there is physical involvement. There are also some therapeutic possibilities in talking over one's difficulties with a religious agent and getting a certain amount of release in that manner.

Applied psychology has something to contribute to a war effort. Major contributions include selection and training of personnel. Morale may be influenced by physical fitness, adequate food and sleep, pride in one's organization, recreation, and, in a negative way, by fear.

Leadership may be improved by careful selection of officer material and by systematic training. Military problems in the perceptual field include individual differences in auditory or visual acuity, or color vision, and the role of adaptation in influencing acuity. Psychological warfare is analogous to the control of public opinion mentioned earlier. Leaflets and radio are the outstanding media. Frequent procedures involve undermining the confidence of the enemy, suggesting that their cause is hopeless, and offering better food and security to individuals who will surrender. At the time of demobilization the psychologist may help with vocational guidance and mental hygiene service.

Finally, psychology has possible contributions to maintaining peace. A certain amount of aggressiveness is inevitable, but it is to be noted that hostile groups may be united against a common enemy. If this enemy could be something other than a group of people, the result might be salutary. It is possible to give this tendency other outlets, for example, in athletics. Another difficulty is that since everyone is somewhat self assertive, they feel superior to certain other people. If this becomes national the looked-down-on may take vigorous steps to achieve status. This difficulty may be minimized by attempting to show that the other group is not so inferior after all and that their culture is interesting. War sometimes springs up because a nation is frustrated and willing to try almost anything that might ameliorate their conditions. The obvious remedy is to promote some improvements in their way of life before they take such radical steps. It may be profitable to study their aspirations.

Education can remedy some of these difficulties through a rational approach to the general futility of war. Such efforts will be more successful with the younger generation than with the older one which has ingrained habits and prejudices. However, efforts of this sort are useless unless they are world wide, for otherwise they give the belligerent groups a distinct advantage. Finally, there are some possibilities of developing a more cooperative attitude by getting representatives of groups together to discuss common problems. If such a procedure is established and includes all those nations which might be in a position to start trouble, the situation holds some promise.

APPENDIX 1

Correlation Techniques

Correlation techniques are involved in almost every aspect of applied psychology, because we need to know the extent to which two variables are related in so many of the problems. The question of correlation first came up in Chapter III in connection with the relationship between estimates of personality traits made from handwriting and the actual possession of those traits as judged by acquaintances. It was encountered again in connection with intelligence test scores as prognostic of grades in school. The correlation coefficient is a standard technique for expressing such relationships. The present explanation is a very rudimentary notion of how correlation coefficients are computed. The examples are absurdly brief in the interest of arithmetical simplicity. A psychologist would never work out statistics on five cases. With the longer real problems, however, there are possible short-cut procedures, and often the methods can be adapted to machine computation.

One of the simpler correlation procedures uses rank differences. Given two series of measurements, it is possible to rank the items in each series and obtain the differences in rank. If these differences are small, it means that there is a close relationship between the two variables. It is possible from these rank differences to compute a correlation coefficient.

The examples which follow compute the correlation between intelligence test score and school grade for five students. In Example I Callahan has an

EXAMPLE I

Student	*Intelligence Test*	*School Grades*	*Rank in Test*	*Rank in Grades*	*Rank Difference*	*Rank Difference Squared*
Callahan	72	91	3	1	2	4
Clark	77	83	2	2	0	0
Daniels	98	80	1	3	2	4
Haskell	47	78	5	4	1	1
Ordway	60	74	4	5	1	1
						10

Sum of rank differences squared (ΣD^2) = 10 N = 5

$$\rho = 1 - \frac{6\Sigma D^2}{N(N^2-1)} = 1 - \frac{6 \times 10}{5(25-1)} = 1 - \frac{60}{5 \times 24} = 1 - .50 = .50$$

intelligence score of 72, Clark 77, and so on, whereas in school grades Callahan makes 91 and Clark 83. In the following columns these scores or grades are ranked. Daniels with his score of 98 is the highest in the test and is given the rank of 1, and Clark comes next with a score of 77 and is given a rank of 2. Similarly, in the school grades Callahan is highest and is ranked 1, and Clark comes next and ranks 2. It can be noted by inspection that there is some tendency for the ranks in the two variables to correspond. This can be seen more clearly by computing the difference in ranks; Callahan ranks first in grades and third in the test, which yields a difference of 2. Small differences mean a close relationship. One more step is necessary—to square the rank differences and total them. The formula for the correlation coefficient appears below the data. The letter rho (ρ) denotes the coefficient; ΣD^2 means the sum of the squares of the differences in rank (in this case 10); N is the number of individuals (in this case five). Substituting these values in the formula and solving gives .50 for the correlation coefficient. This indicates a fair degree of correlation.

By way of comparison, three other hypothetical examples are given. Example II yields what is termed a perfect correlation. Daniels is highest in both test and grades, Clark ranking second in both of them, and so on for the others. The differences in rank are 0 and the correlation coefficient is 1.00. This is the maximum positive correlation that can exist.

EXAMPLE II

Student	*Intelligence Test*	*School Grades*	*Rank in Test*	*Rank in Grades*	*Rank Difference*	*Rank Difference Squared*
Callahan	86	82	3	3	0	0
Clark	90	87	2	2	0	0
Daniels	94	91	1	1	0	0
Haskell	54	72	5	5	0	0
Ordway	68	77	4	4	0	0
						0

$$\Sigma D^2 = 0 \qquad N = 5$$

$$\rho = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)} = 1 - \frac{6 \times 0}{5 \times 24} = 1 - 0 = 1.00$$

Example III shows a negative correlation. Callahan is highest in school grades but lowest in intelligence, and the others show a similar inverse tendency. The result is a correlation coefficient of -1.00. This is the maximum possible negative correlation.

Example IV shows what happens when the variables are essentially unrelated. The actual scores or the ranks show no apparent relation one way or the other. When the computation is carried out the result is .00. Thus correlations can range anywhere between $+1.00$ and -1.00 with .00 indicating the absence of relationship. Although the method of rank differences

EXAMPLE III

Student	*Intelligence Test*	*School Grades*	*Rank in Test*	*Rank in Grades*	*Rank Difference*	*Rank Difference Squared*
Callahan	28	90	5	1	4	16
Clark	39	87	4	2	2	4
Daniels	50	82	3	3	0	0
Haskell	62	75	2	4	2	4
Ordway	81	71	1	5	4	16
						40

$$\Sigma D^2 = 40 \qquad N = 5$$

$$\rho = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)} = 1 - \frac{6 \times 40}{5 \times 24} = 1 - 2 = -1.00$$

EXAMPLE IV

Student	*Intelligence Test*	*School Grades*	*Rank in Test*	*Rank in Grades*	*Rank Difference*	*Rank Difference Squared*
Callahan	95	81	1	2	1	1
Clark	75	88	4	1	3	9
Daniels	69	70	5	4	1	1
Haskell	84	75	3	3	0	0
Ordway	87	68	2	5	3	9
						20

$$\Sigma D^2 = 20 \qquad N = 5$$

$$\rho = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)} = 1 - \frac{6 \times 20}{5 \times 24} = 1 - 1 = .00$$

is simple and convenient, it is not ideal because it incorrectly assumes that the differences between any two adjacent ranks are all the same. Referring to Example I Daniels' test score of 98 is way ahead of the next one which is 77, whereas the difference between Clark and Callahan, who rank second and third with 77 and 72 points, is small. The ranking procedure assumes the difference between Daniels and Clark is the same as that between Clark and Callahan, which, of course, is not the case. Hence, for more refined statistical treatment some other procedure should be followed which does not overlook such cases of striking superiority or inferiority. Such a method is the so-called "products-moments" method. Example V is an oversimplified illustration of the products-moments correlation coefficient. This method is not concerned with ranks but with whether a person who deviates from the

EXAMPLE V

Student	*Intelligence*	*Grades*	*Deviations*		*Deviations Squared*		*Product of Deviations*
	X	Y	x	y	x^2	y^2	xy
Callahan	15	10	+6	+4	36	16	+24
Clark	8	7	−1	+1	1	1	−1
Daniels	6	5	−3	−1	9	1	+3
Haskell	6	2	−3	−4	9	16	+12
Ordway	10	6	+1	0	1	0	0
Total	45	30			56	34	
Average	9	6			11.2	6.8	+38
Square Root of Average					3.34	2.61	

$$r = \frac{\Sigma xy}{N\ \sigma_x\ \sigma_y} \qquad \sigma_x = \sqrt{\frac{\Sigma x^2}{N}} \qquad \sigma_y = \sqrt{\frac{\Sigma y^2}{N}}$$

$$\sigma_x = \sqrt{\frac{56}{5}} = 3.34 \qquad \sigma_y = \sqrt{\frac{34}{5}} = 2.61$$

$$r = \frac{38}{5 \times 3.34 \times 2.61} = \frac{38}{43.6} = .87$$

average in one variable deviates correspondingly in the other (*moment* is a statistical term for deviation). The first two columns give the intelligence scores and school grades. Following conventional notation these are indicated as X and Y (capital letters for raw scores, small letters for deviations). Each variable is totaled and averaged, yielding 9 and 6 respectively. The next step is to take deviations from the averages, x representing the deviation of any X score from its average. For instance, Callahan's intelligence score of 15 is 6 points above the average intelligence score of 9, hence the deviation is +6. Callahan's grade of 10 is actually 4 points above the average of 6, hence the deviation is +4. Scores that are less than the average have deviations with minus signs. The next step is to square the deviations and the x^2 and y^2 values appear in the next two columns. From these deviation-squared terms it is possible to compute the standard deviation, which is a measure of variability. The formula appears just below the data. It involves getting the sum of the deviations, dividing by their number—that is averaging them—and then taking the square root of the result. This yields standard deviations, as indicated, of 3.34 and 2.61 for the two variables respectively. The final step is to take the product of the deviations, that is, x multiplied by y for each individual. Callahan's deviations of +6 and +4 have a product of +24. It is to be noted that the product of two minus deviations is plus so that being below the average in both variables is just as significant as being above in both variables. Some negative products, however, often result. The algebraic sum of these deviations is 38. Now it is merely a matter of substituting the above values in the final formula which appears below the data; r denotes the correlation; Σxy is the sum of the products of the deviations; N is the number of cases; σ_x and σ_y are the two standard deviations. This yields a correlation coefficient of .87 which indicates a close relationship between the variables.

In actual practice many short cuts are possible. We may group the data into class intervals instead of dealing with the actual magnitude of every single score, or, with calculating machines, it may be unnecessary to compute deviations at all. The foregoing explanation, however, is sufficient to clarify the general concept of correlation coefficients, and the reader concerned with actual computation naturally will refer to standard books on statistics.[1] The interpretation of correlations of different magnitude in terms of the error made when predicting one variable from the other has been discussed already in Chapter 3 (page 43).

---

[1] For example, Garrett, H. E., *Statistics in Psychology and Education.* New York: Longmans, Green, 1947

APPENDIX 2

Significance of Differences

Data have been presented at numerous points in the discussion on the difference between two percentages or two averages, and it always is a legitimate question in such cases whether the obtained difference is a real one or is merely accidental. This point was first raised in Chapter 5 (page 93) in connection with developing scoring patterns for Strong's Interest Inventory. The example considered there will suffice for the present discussion. The question was whether the finding that, for example, 70 per cent of the engineers marked a certain preference item such as "looking through a telescope" in one way whereas only 50 per cent of the non-engineers marked it that same way, represented a really significant difference between engineers and laymen. It is quite possible that this obtained difference of 20 per cent represents a sampling error. Assume for the moment that the data were based on 100 engineers and 200 laymen. It is possible that, if the experiment were repeated with other samples of this size, the same difference would not be obtained. The real difference theoretically would be found by giving the test to *all* engineers and to all laymen. The question is how closely the observed difference obtained with this one limited sample approximates the real difference. The answer lies in the theory of probability.

It is probable that if the experiment was repeated over and over with different samples, in most samples the percentage of engineers indicating a liking for the telescope would be greater than the percentage of laymen. Occasionally, however, the difference might go in the reverse direction. The main interest is, out of these numerous samples (theoretically infinite in number), what proportion would yield a difference in the same direction as did the original sample, that is, with a larger percentage of the engineers marking the item? If, say, 99 per cent of the samples pointed in this direction, most scientists would agree that there was a real trend for engineers to make that particular response more often than laymen or, putting it another way, the probability of a real difference in favor of the engineers would be 99 per cent. If, however, only 60 per cent of these repeated samples showed this trend it would be an unwarranted assumption that engineers actually did prefer the telescope to a greater extent than did laymen.

In the practical situation it obviously is impossible to secure these numerous samples. It is possible, however, to estimate the probability on the basis of the first sample alone. To do this, it is necessary to consider the standard deviation of the difference as it was pointed out in Chapter 5. The formula for this standard deviation is as follows:

$$\sigma_{diff.} = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2}}$$

where p_1 indicates the percentage of engineers liking the item, q_1 the percentage of engineers not expressing a liking for it, N_1 the number of engineers, p_2 the percentage of laymen liking the item, q_2 the percentage of laymen not expressing a liking for it, and N_2 the number of laymen. Assume that, in the present case, the sample comprises 100 engineers and 200 laymen, and that 70 per cent of the engineers selected the item "looking through a telescope," whereas 50 per cent of the laymen marked that same item. Substituting these values in the above formula gives the following:

$$\sigma_{diff.} = \sqrt{\frac{70 \times 30}{100} + \frac{50 \times 50}{200}} = \sqrt{21 + 12.5} = 5.8$$

In subsequent hypothetical samples it is probable that many of the differences would be fairly close to the 20 per cent found in the present instance. Some differences might be 25 or 30, and some 15 or 10 per cent, with still fewer toward the extremes. There might even be a few above 40 or less than zero —that is with the difference in the opposite direction. If these differences obtained in the successive samples are plotted in the form of a distribution curve with the magnitude of the differences on the abscissa and the frequencies of the differences on the ordinate, the resulting curve will be the typical normal frequency, or probability, curve similar to that shown in Figure 1 (page 34). The ordinate for a difference of 20 per cent (which was found in the present single sample) would be at the middle of the curve and would be the largest of the ordinates. Moreover, the standard deviation of the difference, like that just computed, would represent the standard deviation of this curve. As was pointed out in Chapter 16 (page 433), if we know the midpoint or average of such a curve and its standard deviation, we can compute from the equation of the curve just what proportion of the area lies between any particular limits expressed in terms of the standard deviation. Between an ordinate erected at the average and one erected one sigma above or below the average exactly 34 per cent of the area of the curve is included. Similarly, between the average ordinate and an ordinate 2 standard deviations distant, 48 per cent of the cases are included. This reasoning may be extended to determine what proportion of the area of the curve is beyond the zero point as we go toward the left. If we erect an ordinate at zero and find a considerable proportion of the area of the curve at the left of that ordinate, it simply means that there is a rather high probability that, as additional samples are taken, the difference will be in a direction opposite that obtained in the present study, or specifically, that laymen will select the given item more frequently than will engineers. If this probability of the difference reversing in direction is very great, we certainly would be unwarranted in assuming that we have a significant difference. In the present example with the difference—the midpoint on the curve—at 20 and with a standard deviation of 5.8, in order to reach the zero point along the base-line of the curve we would have to go out about 3.5 standard deviation units. If we erect an ordinate at that point, as a matter of probability, the area of the curve at the left is something less than a tenth of 1 per cent of the area of the whole curve. In other words, the probability of the difference being reversed in direction for subsequent samples is practically *nil,* and we are justified in saying that we have a significant difference in favor of the engineers marking the item the way they did in this particular sample.

It will clarify the discussion to note what would happen if the data were somewhat different. Suppose that the per cents of engineers and laymen selecting the item about the telescope had been respectively 70 per cent and 60 per cent with 100 and 200 subjects, the computation would be as follows:

$$\sigma_{diff.} = \sqrt{\frac{70 \times 30}{100} + \frac{60 \times 40}{200}} = \sqrt{21 + 12} = 5.75$$

The standard deviation of the difference is about the same, but inasmuch as the difference itself is only 10, its ratio to the standard deviation is smaller—about 1.7. The curve would have its midpoint at 10 and, moving along the abscissa leftward, 1.7 sigma units would bring us to zero. If an ordinate is erected at this zero point, it can be determined from appropriate tables that the area to the left of this ordinate is about 5 per cent of the curve. In other words, under these circumstances there are about 5 chances out of 100 that if data are secured with additional samples the difference will be in the reverse direction. A statistician would hesitate to claim a significant difference with such odds against him.

It is well to consider the case of a still smaller difference, namely 70 per cent of the engineers marking the item and only 65 per cent of the laymen. The standard deviation of the difference may be computed as follows:

$$\sigma_{diff.} = \sqrt{\frac{70 \times 30}{100} + \frac{65 \times 35}{200}} = \sqrt{21 + 11.4} = 5.7$$

Here the standard deviation is about the same as in the other cases, but the difference divided by the standard deviation is a scant .9. With a ratio of this magnitude the probability tables indicate about 18 per cent of the curve to the left of zero, that is, 18 chances out of a 100 that the difference would go in the opposite direction if the experiment were repeated. Obviously, no scientific value could be attached to such a difference. This ratio of the difference to its standard deviation is termed the critical ratio and has been referred to at numerous places throughout the text.

It is obvious from the foregoing discussion that as the difference gets smaller its significance decreases. In the above instances, however, we assumed the same number of persons in the original sample. It may be well to note what happens as the size of the sample changes. Suppose that instead of 100 engineers and 200 laymen the study was made with only 10 of each and suppose that the percentages came out as in the first instance cited above, 70 and 50 per cent of the two groups marking the item in a certain fashion. Computation of the standard deviation now is as follows:

$$\sigma_{diff.} = \sqrt{\frac{70 \times 30}{10} + \frac{50 \times 50}{10}} = \sqrt{210 + 250} = 21.4$$

Obviously with this small number of cases we get a much larger standard deviation. The critical ratio now is a trifle over .9 which means that there is about a 17 per cent probability of the difference going in the opposite direction on repeated samples, and, therefore, the difference has no significance. Apparently, increasing the size of the sample increases the significance of the difference. This is reasonable because, as the sample gets larger and larger, it more closely approximates the total population that theoretically exists.

The basic problem is the probability that if the experiment were repeated, the difference would be found in the reverse direction or, perhaps what is more pertinent, the probability that the difference would remain in the same direction. The following brief table indicates for a few critical ratios the probability out of 100 that an obtained difference is real in the sense that on repetition the difference would still point in the same direction:

Critical Ratio	*Chance in 100 that Difference is Real*
.5	69
1.0	84
1.5	93
2.0	98
2.5	99.4
3.0	99.9

A critical ratio of 3 is accepted by most scientists as indicating a real or significant difference because the chances of its being reversed on a repetition of the experiment or tabulation are only about 1 in 1000. With ratios between 2 and 3 authorities differ in their interpretation. There is some presumption of significance, but most workers hold out for a very high probability indicated by the critical ratio of 3.

Similar problems arise when the difference is not between two percentages but between two averages, such as the average intelligence of a group of men *versus* the average intelligence of a group of women. The formula for the standard deviation of the difference under these circumstances is not the same as the one above cited, but once the computation of this standard deviation of the difference has been made, the interpretation and the determination of significance are exactly as above described. The formula is:

$$\sigma_{diff.} = \sqrt{\frac{\Sigma x_1^2}{N_1^2} + \frac{\Sigma x_2^2}{N_2^2}}$$

where x_1 for example, indicates the deviation of an individual man's score from the average intelligence score of all the men in the sample, and x_2 represents the deviation of an individual woman's score from the average intelligence score of the women, and N_1 and N_2 represent the numbers of men and women respectively. After the individual deviations have been determined, they are squared and summated as indicated by the formula. If the two measures involved have an appreciable correlation with each other, a more complicated formula must be used. Once this standard deviation of the difference between averages has been obtained, the actual difference between the averages is divided by it to yield the critical ratio, and its interpretation is exactly like the interpretation of the difference between percentages. If the critical ratio is 3 or more, the difference between the averages is regarded as significant.

INDEX

- ACADEMIC RECORD, vocational prediction from, 467
- Acceleration, educational, 80
- Accident clinic, 603
- Accidents:
  - alcohol, 599
  - aptitude tests, 594
  - clinical approach to, 603
  - education as preventive of, 604
  - emotional causes of, 601
  - fatigue, 570, 599
  - ignorance of hazard, 598
  - illumination, 600
  - susceptibility to, 594
  - tests for susceptibility, 594
  - ventilation, 600
- Achievement tests:
  - educational tests, 84, 133, 469
  - general, 32
  - trade, 447
- Adaptation, effect on testimony, 294
- Adolescence, school's function during, 111
- Adult education, 183, 644
- Advertising:
  - art work, 720
  - attention:
    - color, 711
    - comic, 708
    - contrast, 697
    - intensity, 695
    - isolation, 699
    - motion, 696
    - novelty, 706
    - pictures, 714
    - position, 700
    - size, 689
  - consumer analysis, 659
  - history, 648
  - imagery, 721
  - interests of prospect, 680
  - instinct, 667
  - memory:
    - association test, 736
    - contests, 739
    - direction of association, 735
    - motor reinforcement, 738
    - narrative, 740
    - principles, 732
    - reminders, 739
    - rhyme, 737
    - rhythm, 737
    - trade mark, 742
  - prospect, adjusting to, 678
  - psychological methods:
    - coupons, 657
    - historical method, 659
    - interviews, 653
    - questionnaire, 656
- Advertising (*Cont.*):
  - rationalization, 676
  - reasoning, 675, 679
  - suggestion, 661 ff.
- Age:
  - advertising prospect, 682
  - illumination requirements, 528
  - interest changes, 95, 682
  - mental, 68
  - morale, 637
  - vocational prediction, 476
- Aggression and maladjustment, 264
- Alcohol:
  - accidents, 599
  - crime, 384
- Alpha intelligence test, 2
- Altruism, 123
- Appeals, selling:
  - long-circuit, 674
  - relation to product, 677
  - relation to prospect, 678
  - short-circuit, 661
- Appreciation:
  - art, 105, 768
  - music, 105, 770
- Apprentice training, 502
- Aptitude tests:
  - battery of, 440
  - examples, 444
  - general, 31, 61 ff., 191, 417
  - morale, contribution to, 637
  - special, 31, 83, 192 ff., 416
  - terminology, 416
  - total situation, 435
  - validity, 414, 436
  - weighting, 440
- Army Alpha intelligence test, 2
- Aroma in selling, 663
- Art appreciation, 105, 768
- Association:
  - constellation, 24, 168, 303
  - direction of, 735
  - laws, 24
  - principles in advertising, 732
  - reaction, crime detection, 325
  - test:
    - advertising, 736
    - clinical, 246
- Association-reaction, crime detection, 325
- Astrology, 39
- Athletics, 772
- Atmosphere in selling, 662
- Attention:
  - accommodation, 19, 301
  - advertising:
    - art principles, 719
    - color, 711

Attention (*Cont.*):
  advertising (*Cont.*):
    comic, 708
    contrast, 697
    imagery, 721
    intensity, 695
    isolation, 699
    motion, 696
    novelty, 706
    pictures, 714
    position, 700
    size, 689
    stimuli to attention, 689 ff.
    unity, 718
  habits of, 166
  range, 19, 300
  testimony:
    accommodation, 301
    range, 300
    stimuli to attention, 300
  voluntary *vs.* involuntary, 18
Attitudes:
  age, as influencing, 98
  measurement, 98
  modification of, 101
  scales, 98, 615
  school, effect of, 101
  suggestion, 100
Audience, psychology of, 774
Audimeter, 652
Authoritarian atmosphere in school, 108
Auto-suggestion, medical practice, 232

BARGAINS, 673
Belief:
  desire, relation to, 674
  evidence, relation to, 675
Biographical data for vocational prediction:
  age, 476
  marital status, 477
  stature, 475
  weighting, 477
Blood pressure, crime detection, 340
Bonus, 493
Brain waves, epilepsy, 258
Budgeting time, 156

CHARACTER EDUCATION, 102
Colorblindness, 193, 293
Color:
  advertising, 711
  atmosphere, 714
  attention value, 716
  illumination, 539
  preference, 713
  typography, 712
Comic:
  advertising, 708
  social facilitation, 710
  subjective *vs.* objective, 709
Compensation for maladjustment, 264
Competition:
  as motive, 119
  group *vs.* individual, 120, 497
  individual *vs.* group, 120
  industry, 496
  school, 119
Complex, suppressed, 251, 365
Conditioned response, 22, 492
Confession, 323
Constellation, 24, 168, 303
Constitutional psychopathic inferiority, 257
Consumer analysis, 659
Contest, 739
Cooperative research, 4
Correlation coefficient:
  forecasting efficiency of, 44
  interpretation of, 43, 438
  nature, 43, 803
  partial, 441
Coupons, 657, 667
Crime:
  alcohol, 384
  drugs, 383
  narcotics, 383
  suggestion as cause:
    associates, 380
    books, 382
    moving pictures, 382
    newspapers, 381
    radio, 383
Crime detection methods:
  association-reaction, 325
  blood pressure, 340
  breathing, 334
  electrodermal response, 351
  history, 324
  inspiration-expiration ratio, 338
  legal status of, 355
  Luria method, 330
  miscellaneous methods, 353
  misuse, 354
Crime prevention:
  drug control, 401
  education, 409
  eugenics, 392
  pre-delinquency, 389
  punishment, 402
  suggestion, minimizing, 399
Criminals:
  borderline intelligence, 377
  casual, 378
  complexes, 365
  feeble-minded, 370
  insane, 362
  mental defect, 370
  mentally disordered, 362
  personality deviations, 367
  professional, 379
Criteria:
  combining heterogeneous, 433
  production figures, 430
  reliability, 431, 433
  supervisor's judgment, 432
  work sample, 431
Critical ratio, 94
Critical score:
  aptitude test, 439
  trade test, 449
Cross-examination, 313

DAYDREAMING, 88
Decibel, 550
Decisions, unnecessary, 513

Decoys in selling, 708
Defective, mental (*see* Feeble-minded)
Delusion, 243
Dementia praecox, 255, 362
Dictionary of Occupational Titles, 4, 204
Difference, significance of, 94, 808
Direct mail advertising, 756
Discipline:
  industry, 627
  school, 90
Disorder, mental (*see* Mental disorder)
Distractions:
  study place, 155
  work place, 166
Distribution, normal frequency, 34
Diurnal changes in efficiency, 157, 570
Drama, 778
Dreams:
  analysis for diagnostic purposes, 252
  external stimuli, 251
  suppressed complexes, 252
Drive, 27
Drugs and crime, 383, 401
Dummy magazine, 650

EDUCATIONAL GUIDANCE, 217
Effect, law of, 117, 490
Electrodermal response, crime detection, 351
Electroencephalogram, 258
Electrographic scoring of tests, 73
Emotion:
  bodily response, 170
  conditioned, 23, 171, 180, 275
  control of, 170
  disturbance in industry, 513
  endocrines, 30
  memory, effect on, 302
  morale, effect on, 637
  nature, general, 29
  public opinion, 785
  religion, 790
  school, manifestations in, 87
Employee representation, 635
Employment trends, 213
Epilepsy, 258, 364
Eugenics:
  crime prevention, 392
  methods, 397
Evasion and maladjustment, 264
Examinations:
  cross-, 313
  essay type, 129
  legal, 313
  medical, 228
  objective, 130
  oral, 130
  writing of, 163
Experience, vocational, 470
Extroversion, 33, 177
Eye movements during reading, 160
Eye shades, 535
Eye *vs.* ear, 752

FACTOR ANALYSIS:
  interest patterns, 209
  merit ratings, 466
Familiarity, 179
Fashion, 670
Fatigue:
  accidents, 570
  hours, 573
  measurement, 565
  mental, 563
  ocular, 533
  pauses, 576
  posture, 571
  production curves, 568
  rest pauses, 576
  vibration, 572
Feeble-minded:
  classes of, 76
  criminals:
    characteristics, 370
    frequency, 371
    repeaters, 375
    type of crime, 376
  fertility, 395
  heredity, 392
  nature, 75
Fetishism, 364
Flats *vs.* standards, 704
Foreman training, 503
Follow-up, direct mail, 741
Forgetting, curve of, 140, 741
Freud, 250

GALLUP INTERVIEW, 653
Glasses for fine industrial work, 532
Golden section, 720
Good will in selling, 760
Graphic rating scale, 458
Graphology, 41
Grievances, industrial, 626
Group therapy, 284
Growth, physical, 65

HABIT:
  breaking of, 164
  economy of, 164
Hallucination, 243
Halo effect:
  examinations, essay, 129
  rating scales, 462
Handedness, 516
Handles, efficiency of, 516
Handwriting, 41
Headline length, 699
Heredity:
  aptitudes, 67
  feeble-mindedness, 392
  insanity, 253
  intelligence, 67
  mental defect, 392
  mental disorder, 253
Humor sense, test of, 182
Hypnosis:
  age regression, 252
  crime, 311
  psychotherapy, 274
  testimony, 311
Hysteria, 259

Id, 250
Illumination:
  accidents, 600
  acuity, 536
  alertness influenced by, 538
  color, 539
  distribution, 533
  dynamogenic effect, 538
  fatigue, 533
  fluorescent, 541
  indirect, 533
  industrial efficiency, 527 ff.
  intensity, 527
  minimal, 528
  morale, 631
  shadows, 537
  street, 537
  study place, 154
Imagery:
  advertising, 721
  pictures, 723
  trade names, 722
Incentive:
  competition, 496
  effectiveness, general, 123
  immediate goal, 497
  induction of new employees, 495
  prestige, 495
  tests, necessity during, 427
  wage, 493
Individual differences:
  general, 1, 34
  industrial adjustment to, 515
Individualized instruction, 81, 144
Inhibition, retroactive:
  learning, 127
  testimony, 304
Ink-blot test, 249
Insanity (*see* Mental disorder)
Inspiration-expiration ratio, 338
Instinct:
  advertising and selling:
    curiosity, 671
    fear, 669
    food, 668
    parental, 669
    play, 671
    self-assertion, 670
    sex, 669
  nature, general, 20, 668
Instructions, test, 425
Intelligence:
  advertising prospect, 678
  distribution of, 75
  growth of, 76
  hierarchy of occupations, 197
  mechanical, 74
  monotony, 588
  nature of, 31
  occupational level and, 82
  optimum *vs.* minimum, 198
  quotient (IQ):
    computation, 70, 245
    constancy of, 77
  school:
    importance in, 66
Intelligence (*Cont.*):
  school (*Cont.*):
    progress and, 79
  social, 74
  surveys, 83
  tests:
    Binet, 68, 245, 417
    group, 71, 417
    industrial use, 445
    performance, 73, 245
Interests:
  advertising prospect, 680
  bodily expression of, 172
  change with age, 95, 682
  development of, 172
  extracurricular, 96
  inference from activities, 92, 208
  information test, 92
  inventory, 93, 209, 446
  measurement, 91 ff.
  motivation, school, 95
  motivational value, 122
  school motivation, 95
  sex differences, 638
  vocational:
    spurious, 207
    permanence of, 210
Interview:
  clinical, 239
  diagnostic, 239
  employment:
    improvement of, 480
    rating scale, 481
    unreliability, 479
  market research:
    sampling problems, 654
    telephone, 655
  morale, 618
  therapeutic:
    cathartic, 280
    directive, 279
    nondirective, 280
    termination of, 283
Introspection, 12
Introversion, 33, 177

Job analysis:
  methods, 483
  purpose, 483
  test selection, 434
  vocational guidance, 200
Job evaluation, 485
Job families:
  development of, 472
  employment use, 471
  military use, 474
  nature, 205, 471
  tables, 473
  vocational guidance, 206
  vocational selection, 471
Judge:
  bias, 317
  numbers, choice of, 318
Jury:
  discussion, effect of, 316
  personnel, 315

- KALLIKAK FAMILY, 394
- Kent-Rosanoff association test, 246

- LEADING QUESTION, 309
- Learning:
  - conditioning, 22, 492
  - curves of, 135, 499
    - equation, 139, 500
    - plateau, 138
  - distributed, 127
  - economy of, 115 ff.
  - inhibition, retroactive, 127
  - insight, 23, 138
  - intention, 128
  - law of effect, 22, 117, 490
    - punishment, 117, 491
    - recitation, 124
    - reward, 117, 491
  - laws of, 21, 115, 489
  - overlearning, 129, 142
  - partial activity, 126, 498
  - transfer of training, 146, 498
  - trial and error, 21
  - whole *vs.* part, 127
- "Lie detector" (*see* Crime detection; *see also* Polygraph)
- Loads, transporting by hand, 514
- Lobotomy, 271
- Luria technique, 330

- MAGAZINES, advertising medium, 756
- Man-to-man rating scale, 457
- Manic depressive insanity, 256, 363
- Marital status, vocational prediction from, 477
- Maturation, 20, 135
- Media, advertising:
  - direct mail, 756
  - magazines, 756
  - newspapers, 755
  - outdoor display, 759
  - radio, 749
  - specialties, 757
- Medicine:
  - examination, medical, 228
  - physician's manner, 227
  - preventive, 232
  - psychosomatic, 223
  - suggestive therapeutics, 230
  - waiting room, 224
- Melancholia, 257, 363
- Memory (*see also* Learning):
  - advertising:
    - association test, 736
    - contests, 739
    - direction of association, 735
    - motor reinforcement, 738
    - narrative, 740
    - principles, 732
    - reminders, 739
    - rhyme, 737
    - rhythm, 737
    - trade mark, 742
  - economy of, 25, 168
  - improvement of, 168
  - people's names, 169
  - principles, 24, 732

- Memory (*Cont.*):
  - "systems," 53
  - testimony:
    - constellation, 303
    - emotion, 302
    - imagination, 305
    - intention, 304
    - recency, 302
    - recognition, 305
    - retroactive inhibition, 304
- Mendel's law:
  - mental defect, 394
  - mental disorder, 253
- Mental defect (*see* Feeble-minded)
- Mental disorder:
  - causes:
    - heredity, 254
    - predisposing and exciting, 253
  - criminals, 362
  - diagnosis:
    - case history, 243
    - interview, 239
    - psychoanalysis, 250
    - tests, 244
  - minor maladjustments, 260
  - physiogenic types:
    - epilepsy, 258
    - paresis, 257
    - senile dementia, 257
    - toxic psychoses, 258
  - psychogenic types:
    - constitutional psychopathic inferiority, 257
    - manic depressive, 256
    - melancholia, 257
    - paranoid personality, 256
    - schizophrenia, 255
  - psychoneuroses:
    - hysteria, 259
    - neurasthenia, 259
    - psychasthenia, 259
- Mental hygiene:
  - methods (*see* Psychotherapy)
  - origin, 273
  - prophylaxis, 288
- Merit rating, 464
- Monotony:
  - alleviation, 591
  - intelligence, related to, 588
  - production as indicative of, 586
  - tests of susceptibility, 589
  - time estimation, 298
  - types, 584, 590
- Morale:
  - adult education, 643
  - age, 637
  - aptitudes, 637
  - attitude scale, 615
  - disciplinary situation, 627
  - employment procedure, 621
  - environment, 630
  - fear, 636
  - health, 639
  - interviews, 618
  - jealousy, 634
  - measurement, 614

Morale (*Cont.*):
  mental hygiene, 640
  objective criteria, 620
  recreation, 643
  sex, 638
  social relationships, 631
  suggestion, 633
  supervisor, 623
  survey, 612
  welfare work, 643
Motion, perception of, 297
Motion study, 508
Motivation:
  competition, 119
  effectiveness, general, 123
  interest, 122
  prestige, 121
  progress, knowledge of, 121
Motive:
  conflict of, 29
  nature, 27
Moving pictures:
  advertising, 696
  attitudes, influence on, 100
  crime, 383
  techniques, 779
Multiphasic personality tests, 246
Multiple-track plans, 80
Music:
  appreciation of, 105, 770
  aptitude for, 770
  distraction in mental work, as a, 156
  industrial, 552 ff.
  preferences for, 768

NARCOTICS, crime, 383
Natural selection, 396
Negative appeal in selling, 666, 670
Negative suggestion:
  advertising and selling, 665
  preventive medicine, 234
Nervous system, 13
Neurasthenia, 88, 259
Neuroses, experimental, 263
Newspapers:
  advertising medium, 755
  crime, 381
Noise:
  distraction, 546
  industrial efficiency, 551
  metabolism, effect on, 548
  morale, 631
  muscular tension, 548
  overcompensation for, 547
  reduction, 551
Nominating-technique ratings, 461
Newspaper:
  attitudes, influence on, 101
  crime, 381
Normal frequency curve, 34
Nursery school, 107

OATH, 313
Occupational therapy, 277
Odors in selling, 663
Old age counseling, 287
Omnibus test, 424
Outdoor advertising, 759
Overlearning, 129, 142

PARANOID:
  delusions, 243, 363
  personality, 256
  schizophrenic, 256
Paresis, 257, 363
Partial correlation, 441
Peace, 796
Percentile scores, 73
Perception:
  errors of witness:
    adaptation, 294
    motion, 297
    psychophysical law, 299
    space, 294
    time, 298
    vision, 292
  space, 16
  time, 17
Performance tests:
  intelligence, 73
  trade, 448
Personality:
  crime, 367
  improvement, 57, 174
  interviews, 201
  measurement (*see* Personality: tests)
  nature, general, 32, 173
  rating scales, 202
  tests:
    association, 246
    inventories, 245
    objective, 103, 204, 418, 597
    projective, 248
    subjective, 34, 203, 245
Phrenology, 44
Physiognomy, 46
Pictures:
  advertising and selling, 714
  photograph *vs.* drawing, 715
  relevancy, 716
Place habit, 154, 166
Plateau, 138
Pneumograph, 334
Poetry, 771
Politics, 787
Polygraph, crime detection:
  blood pressure, 340
  breathing, 334
  electrodermal response, 351
  inspiration-expiration ratio, 338
  legal status of, 355
  Luria method, 330
  misuse, 354
Posture and mental efficiency, 154
Praise and blame, 118
Pre-delinquency, 389
Prizes, 117
Proficiency tests:
  educational, 84, 133, 469
  general, 32
  trade, 447
Program analyzer, 650

Projection, 89
Projective techniques, 247, 616
Promotion in school, 79
Propaganda, 102, 787
Pseudo-psychology, 1, 38
Psychasthenia, 259
Psychoanalysis:
  principles, 250
  techniques, 252
  therapy, 278
Psycho-drama, 248, 286
Psychoneuroses, 258
Psychophysical law:
  advertising, 695
  testimony, 299
Psychosomatic medicine, 223
Psychotherapy:
  emotional conditioning, 275
  environmental change, 277
  group therapy, 284
  hypnosis, 274
  interview:
    cathartic, 280
    directive, 279
    nondirective, 280
    termination of, 283
  music, 277
  occupational therapy, 277
  old age counseling, 287
  prophylaxis, 288
  pseudo, 59
  psychoanalysis, 278
  reasoning, 276
  relatives, importance of, 286
  religion, 274
  sublimation, 275
  suggestion, 273
Public opinion:
  education, 786
  emotions, 785
  measurement, 780
  stereotypes, 784
  suggestion, 780
Public relations, 761
Public speaking, 774
Punishment:
  crime prevention, 402
  deterrent effect, 402
  individualization of, 406
  learning situation, 117
  reformation of criminal, 404

QUESTION, suggestion in form of, 309

RADIO:
  advertising medium, 749
  crime, 383
  education, 779
  eye *vs.* ear, 752
Rapport, 239, 279, 619
Raters, training of, 464
Rating scales:
  acquaintance, length of, 463
  checklist, 460
  error, sources of, 462
  graphic, 458
  justification of ratings, 461
Rating scales (*Cont.*):
  man-to-man, 457
  nominating technique, 461
  reliability, 462
  selection of traits, 455
  weighting of traits, 456
Rationalization:
  advertising and selling, 676
  maladjustment, result of, 265
  school, 88
Reading:
  efficiency of, 157
  eye movements during, 160
  speed of, 160, 163
  tachistoscopic training, 161
Recitation, 124, 158
Recklessness, tests for, 204, 597
Recognition:
  testimony, 305
  voice, 306
Recommendations:
  blank, 478
  letter, 478
Reflex:
  conditioned, 22
  nature, 19
Refresher training, 499
Regression:
  equation, 437, 442
  hypnotic age, 252
  maladjustment, result of, 264
Reliability:
  criterion, 431
  rating scales, 462
  tests, 429
Religion:
  emotion, 790
  therapy, 274, 792
Repeaters, criminals, 375
Reprimand, 117
Research, cooperative, 4
Rest pauses:
  duration, 581
  efficiency, 577
  filling, 581
  location, 580
  unauthorized, 578
Reward, learning situation, 117
Rhythm:
  dynamogenic effect, 518
  industrial efficiency, 518
  memory material, 738
Rorschach test, 249

SADISM, 364
Safety campaign, 605
Salesman training, 505
  check on, 507
  special devices, 506
Salesmanship:
  institutional, 505
  resistance to, 763
Scales, rating (*see* Rating scales)
Schizophrenia, 255, 362
School record, vocational prediction from, 467

Sectioning school pupils, 80
Senile dementia, 257, 363
Sex perversion, 364
Shock therapy, 269
Social development, school influence, 106, 143
Social facilitation, 144, 519, 631, 710
Socialized instruction, 144
Sociometric test, 109
Space perception, 16, 294
Specialty advertising, 757
Speed, machine, 517
Speed *vs.* accuracy in tests, 428
Spiritualism, 39
Stammering, 89
Standard deviation, 433, 806
  of difference, 94, 808
Stereotypes, 784
Stature:
  industrial adjustment to, 515
  vocational prediction, 475
Sterilization, eugenic, 398
Study skills:
  diagnosis, 152
  note-taking, 162
  reading, 157
  reviewing, 162
  transfer of, 147
Sublimation:
  maladjustment, result of, 264
  therapeutic, 275
Success experience, 117
Suggestion:
  advertising, general, 661 ff.
  child, 307
  crime, cause of, 380
  epidemic, 310
  expert opinion, 308
  indirect:
    medicine, 231
    selling, 180, 661
  intelligence, relation to, 309
  majority opinion, 308
  medical aspects:
    office, 224
    practice, 230
  morale, 633
  negative:
    advertising and selling, 665
    preventive medicine, 234
  psychotherapy, 273
  public opinion, 781
  questions, form of, 309
  selling one's self, 180
  testimony, 306
Superego, 250
Supervision, industrial, 623
Suppressed complex, 251
Survey Q3R, 159

TACHISTOSCOPE training for reading, 161
Teaching aids, 142
Team work in industry, 522
Teaser copy, 672
Telepathy, 40
Testimonials, 664
Testimony:
  attention:
    accommodation, 301
    range, 300
    stimuli to involuntary, 299
  examination:
    methods of, 312
    order of, 314
  general unreliability, 291
  hypnosis, 311
  judge:
    bias, 317
    numbers, choice of, 318
  jury:
    discussion, effect of, 316
    personnel, 315
  memory:
    constellation, 303
    emotion, 302
    imagination, 305
    intention, 304
    recency, 302
    recognition, 305
    retroactive inhibition, 304
  oath, effect of, 313
  perception:
    adaptation, 294
    motion, 297
    psychophysical law, 299
    space, 294
    time, 298
    vision, 292
  suggestion:
    child, 307
    expert opinion, 308
    intelligence, relation to, 309
    majority opinion, 308
    questions, form of, 309
Tests:
  aptitude (*see* Aptitude tests)
  clinical, 244
  intelligence (*see* Intelligence: tests)
  personality (*see* Personality: tests)
  scoring, 72
  validity (*see* Validity, tests)
  weighting, 192, 196
Test techniques:
  individual *vs.* group, 420
  incentive, 427
  instructions, 425
  material, 423
  misleads, 424
  omnibus, 424
  reliability, 429
  scoring, 427
  time limit, 421
  work limit, 421
Thematic Apperception Test, 247
Therapy:
  endocrine, 272
  psycho- (*see* Psychotherapy)
  shock, 269
Time:
  budget, 156
  of day and efficiency, 157, 570
  perception, 17, 298

Trade mark:
  essentials, 745
  infringement, 745
  shape, 747
  value, 742
Trade name:
  confusion, 745
  essentials, 745
  value, 742
Trade test:
  critical score, 449
  item analysis, 449
  types, 447
Training, industrial:
  apprentice, 502
  foremen, 503
  knowledge of progress, 501
  moving pictures, 500
  salesmen, 505
  short-exposure, 501
  special devices, 500
  tachistoscope, 501
Traits:
  objective, reliability of ratings, 463
  subjective, reliability of ratings, 463
Transfer of training, 146, 498
True-false tests, 130
"Truth serum," 311
Twins:
  intelligence, 392
  mental disorder, 254
Typewriter keyboard, 511
Typography:
  appropriateness, 727
  capitals, 725
  color, 712
  face, 724
  leading, 726
  line length, 726
  novel, 707
  reverse, 698
  size, 694
  upper case, 725

UNITED STATES Employment Service, 4

VALIDITY, tests:
  a priori, 190, 200, 415
  empirical, 67, 192, 415
  face, 190, 200, 415
  for group of jobs, 200
Ventilation:
  accidents, 545, 600
  comfort, 542
  industrial efficiency, 543
  mental work, 543
  mines, 544
  morale, 630
  study place, 155
Vibration, fatigue from, 572
Vicarious function, 13
Vocational dissatisfaction, 188
Vocational guidance:
  aptitude tests, 191
  crime prevention, 409
  experience, 204
  intelligence, 196
  interests, 207
  interview, 201
  job families, 205
  negative *vs.* positive, 190
  opportunities in jobs, 212
  orientation forms, 214
  parental imposition, 87, 188
  personality, 201
  profiles, 215
  self-guidance, 189
  success of, 218
  trade tests, 206
  vocational selection, distinguished from 189, 446
Vocational maladjustment, 188

WAGES, 493
Waiting room, medical, 224
War, psychology in, 2, 4, 792
Wherry-Doolittle method, 443
Welfare work, 643
Work place, efficiency of, 154, 166
Writing, 777

Sardar Dyal Singh Public Library,

NEW DELHI.

DATE LOANED

This book may be kept for

Fourteen days

A fine of **.06 nP.** will be charged for each day the book is kept over-time.

Title..Applied Psychology

Author..Burtt, Harold Ernest.

Accession No. 1108............................

Call No. 150.13 B957A......

Sardar Dyal Singh Public Library,

NEW DELHI.

1. Books may be retained for a period not exceeding 14 days.
2. Books may be renewed on request if they are not required by some other member of the Library.
3. Dog-earing the pages of a book; marking or writing therein with ink or pencil; tearing or taking out pages or otherwise damaging it will constitute an injury to a book.
4. Borrower's will be required to pay full price of any book lost or damaged by them.

HELP TO KEEP THE BOOK NEAT AND CLEAN

S.L.S.

SARDAR DYAL SINGH
PUBLIC
LIBRARY
NEW DELHI

★

Class No. 109
Book No. H362 L
Accession No. 1442
V. 3

DYAL SINGH PUBLIC LIBRARY

ROUSE AVENUE, NEW DELHI-1.

Cl No. 108 H 362 L

Ac No. 1442 vol 3 Date of release for loan

This book should be returned on or before the date last stamped below. An overdue charge of 0 6 P. will be charged for each day the book is kept overtime